

General Counsel 1 of 2

List of documents from the Office of General Counsel

1. Memorandum to Carl Michael Smith, Assistant Secretary for Fossil Energy, from Susan Beard, Acting Assistant General Counsel for General Law, dated March 22, 2002. 1 page. (F2001-00630)
2. Memorandum to the Secretary from Robert S. Kripovicz, Acting Assistant Secretary for Fossil Energy, dated January 24, 2002. 3 pages with 22 enclosures. (F2001-00630)
 - A. Undated document entitled "National Petroleum Council Membership: 2002-2003 Term. 4 pages. (F2001-00630)
 - B. Undated document entitled "Contents." 1 page. (F2001-00630)
 - C. Undated and untitled blank sheet. 1 page. (F2001-00630)
 - D. Undated document entitled "National Petroleum Council Membership: 2002-2003 Term." 15 pages. (F2001-00630)
 - E. Undated and untitled document with the number 4 on Index. 1 page. (F2001-00630)
 - F. Undated document entitled "National Petroleum Council Recommendations For New Appointments - 2002-2003 Term." 15 pages. (F2001-00630)
 - G. Undated and untitled document with the number 5 on Index. 1 page. (F2001-00630)
 - H. Document entitled "National Petroleum Council Membership Classification Distribution," dated January 22, 2002. 1 page. (F2001-00630)
 - I. Undated and untitled blank page. 1 page. (F2001-00630)
 - J. Undated document entitled "National Petroleum Council Membership Classification Distribution 2002-2003." 1 page. (F2001-00630)
 - K. Undated and untitled blank page. 1 page. (F2001-00630)
 - L. Undated document entitled "National Petroleum Council Others Considered and Not Recommended for Appointment 2002-2003 Term." Information withheld under Exemption 6. 1 page. (F2001-00630)
 - M. Undated and untitled document with the number 8 on Index. 1 page. (F2001-00630)

- N. Undated document entitled "National Petroleum Council Departing Members: 2002-2003 Term." Information withheld under Exemption 5 and 6. 4 pages. (F2001-00630)
 - O. Undated and untitled document with the number 9 on Index. 1 page. (F2001-00630)
 - P. Undated document entitled "Sample Letter - Member Leaving Council/Thank You for Service." 1 page. (F2001-00630)
 - Q. Undated document entitled "Sample Letter - Invitation to Serve on Council." 1 page. (F2001-00630)
 - R. Undated document entitled "Sample Letter - Condolence Letter/Thank You for Service." [Mr. Conklin died on October 31, 2001 and is survived by his spouse Carolyn Kerns Conklin. 1 page. (F2001-00630)
 - S. Undated and untitled document with the number 10 on Index. 1 page. (F2001-00630)
 - T. Undated document entitled "Department of Energy Charter National Petroleum Council." 2 pages. (F2001-00630)
 - U. Undated document entitled "Background Information on the National Petroleum Council." 1 page. (F2001-00630)
 - V. Undated document entitled "New Appointments." Information withheld under Exemption 6. 11 pages. (F2001-00630)
- 3. Undated document entitled "Phone Calls." 2 pages. (F2001-00630)
 - 4. E-mail to Seigle Clayton from Charles Washington, dated June 29, 2001. Subject: Re: meeting. 1 page. (F2001-00630)
 - 5. E-mail to Erika Benson from Guido Caranti, dated July 25, 2001. Subject: Venezuela LNG Exports. 1 page. (F2001-00630)
 - 6. E-mail to Erika Benson from Tom Briggs, dated July 25, 2001. Subject: PDVSA letter. 1 page. (F2001-00630)
 - 7. E-mail to Lowell Feld from Charles Washington, dated June 18, 2001. Subject: Re: Country Analysis Briefs (all countries, Middle East, OPE. 1 page. (F2001-00630)
 - 8. E-mail to George Person from David Pumphrey, dated September 24, 2001. Subject: Re: Industry/Interagency Roundtable on Venezuela. 1 page. (F2001-00630)

9. Document entitled "Participant List Industry/Interagency Roundtable on Venezuela." dated September 28, 2001. 3 pages. (F2001-00630)
10. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary of Energy, from Linda Robertson, Vice President, Federal Government Affairs, Enron, dated August 10, 2001. 1 page. (F2001-00630)
 - B. Undated document entitled "2001-018818-Namelist." 1 page. (F2001-00630)
11. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to Ms. Robin Johnston, Scheduler, from Linda Robertson, Vice President, Federal Government Affairs, Enron, dated August 28, 2001. 1 page. (F2001-00630)
 - B. Document entitled "Namelist," dated August 29, 2001. 1 page. (F2001-00630)
12. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary, from Kenneth L. Lay, Chairman and Chief Executive Officer, dated January 22, 2001. 1 page. (F2001-00630)
 - B. Document entitled "Namelist," dated January 22, 2001. 1 page. (F2001-00630)
13. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary, from Kenneth L. Lay, Chairman and Chief Executive Officer, Enron Corp., dated January 22, 2001. 1 page. (F2001-00630)
 - B. Document entitled "January 22, 2001." 1 page. (F2001-00630)
14. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to the Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, Enron Corp., dated July 31, 2001. 1 page. (F2001-00630)
 - B. Document entitled "Namelist," dated August 6, 2001. 1 page. (F2001-00630)
15. Document entitled "Folder Profile." 1 page with three enclosures. (F2001-00630)

- A. Document entitled "Facsimile Cover Sheet." 1 page. (F2001-00630)
 - B. Letter to the Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, Enron Corporation, dated July 31, 2001. 1 page. (F2001-00630)
 - C. Document entitled "Namelist," dated August 1, 2001. 1 page. (F2001-00630)
16. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Letter to The Honorable Spencer Abraham, Secretary of Energy, U.S. Department of Energy, from Jeffrey K. Skilling, President & Chief Executive Officer, dated July 12, 2001. 1 page. (F2001-00630)
 - B. Undated document entitled "Namelist - July 13, 2001." 1 page. (F2001-00630)
17. Document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Undated document entitled "Ken Lay, Chairman, Enron Invites you to A Retirement Reception." 1 page. (F2001-00630)
 - B. Undated document entitled "Nameslist (2001-004148) 1 page. (F2001-00630)
18. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Letter to The Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, dated February 27, 2001. 1 page. (F2001-00630)
 - B. Document entitled "Nameslist," dated February 27, 2001. 1 page. (F2001-00630)
19. E-mail to David Pumphrey from John Hardy, Jr., dated October 22, 2001. Subject: Enron's Jose LNG Project. 1 page. (F2001-00630)
20. Undated calendar for Randa Hudome. 1 page. (F2001-00630)
21. Calendar for Randa Hudome, dated May 29, 2001. 1 page. (F2001-00630)
22. Calendar for Randa Hudome, dated September 10, 2001. 1 page. (F2001-00630)
23. Undated document entitled "Folder Profile." 1 page with 4 enclosures. (F2001-00630)
- A. Fax Transmission to Kyle McSarrow from Dave Lugar, dated May 21, 2001. 1 page. (F2001-00630)
 - B. Letter to Mr. Kyle McSarrow, Chief of Staff, United States Department of

Energy, from David R. Lugar, Quinn Gillespie & Associates, L.L.C, dated May 21, 2000. 1 page. (F2001-00630)

- C. Undated document entitled "Exhaustive Single Items Report." 1 page. (F2001-00630)
- D. Document entitled "Namelist," dated May 24, 2001. 1 page. (F2001-00630)
- 24. Document entitled "Schedule For Francis Blake," dated September 19, 2001. 1 page. (F2001-00630)
- 25. Letter to The Honorable Francis Blake, Deputy Secretary, from Linda Robertson, Vice President, Federal Government Affairs, dated September 7, 2001. 1 page. (F2001-00630)
- 26. Document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to the Honorable Spencer Abraham, from Kenneth L. Lay, Chairman and Chief Executive Officer, Enron, dated January 22, 2001. 1 page. (F2001-00630)
- 27. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman and Chief Executive Officer, Enron Corporation, dated January 22, 2001. 1 page. (F2001-00630)
- 28. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to Mr. Kenneth Lay, Chairman and CEO, from Spencer Abraham, Secretary of Energy, dated February 28, 2001. 1 page. (F2001-00630)
 - B. Undated document entitled "Autopen Authorization." 1 page. (F2001-00630)
- 29. Document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to the Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, Enron Corporation, dated February 27, 2001. 1 page. (F2001-00630)
- 30. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to Ms. Majida Dandy, Senior Advisor to Spencer Abraham, Secretary of Energy, from Linda Robertson and Lora Sullivan, Vice President, Federal Government Affairs, dated April 3, 2001. 1 page. (F2001-00630)

31. Undated document entitled "Folder Profile." 1 page with three enclosures. (F2001-00630)
- A. Letter to Mr. Spencer Abraham, from Kenneth L Lay, Chairman of the Board, Enron Corporation, dated March 30, 2001. 1 page. (F2001-00630)
 - B. Letter to Mr. Kenneth L. Lay, Chairman of the Board, Enron Corporation, dated Spencer Abraham, Secretary of Energy, dated April 27, 2001. 1 page. (F2001-00630)
32. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
- A. E-mail to The Secretary from Merrill Barlow, dated June 21, 2001. Subject: Policy. Information withheld under Exemption B6. 1 page. (F2001-00630)
33. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Letter to the Honorable Spencer Abraham, Secretary of Energy, from Jeffrey K. Skilling, President & Chief Executive Officer, Enron Corporation, dated July 12, 2001. 1 page.
 - B. Undated document entitled "U.S. Energy Policy at a Crossroad: Alternative Futures for the Current "Energy Crisis." 4 pages. (F2001-00630)
34. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
- A. Letter to Mr. Ken Lay, Chairman, Enron Corporation, from Spencer Abraham, The Secretary of Energy, dated August 15, 2001. 1 page. (F2001-00630)
35. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Facsimile to Spencer Abraham, Secretary, from Robert T. "Hap" Boyd, dated July 31, 2001. 1 page. (F2001-00630)
 - B. Letter to The Honorable Spencer Abraham, Secretary of Energy, from R. T. "Hap" Boyd, Enron Wind Corporation, dated July 31, 2001. 1 page. (F2001-00630)
36. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
- A. Facsimile Cover Sheet to The Honorable Spencer Abraham, Secretary of Energy, from Kenneth Lay, Office of the Chairman, Enron, dated August 1, 2001. 1 page. (F2001-00630)
 - B. Letter to the Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, Enron Corporation, dated July 31, 2001. 1 page.

(F2001-00630)

37. Undated document entitled "Folder Profile." 1 page with two enclosures. (F2001-00630)
 - A. Letter to the Honorable Spencer Abraham, Secretary of Energy, from R.T. "Hap" Boyd, Enron Wind Corporation, dated July 31, 2001. 1 page. (F2001-00630)
 - B. Undated document entitled "Giving Wings to Vision." 1 page. (F2001-00630)
38. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary of Energy, from Kenneth L. Lay, Chairman of the Board, Enron Corporation, dated July 31, 2001. 1 page. (F2001-00630)
39. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to The Honorable Spencer Abraham, Secretary of Energy, from Linda Robertson, Vice President, Federal Governmental Affairs, Enron, dated August 10, 2001. 1 page. (F2001-00630)
40. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to Robin Johnson, Scheduler, from Linda Robertson, Vice President, Federal Government Affairs, Enron, dated August 28, 2001. 1 page. (F2001-00630)
41. Undated document entitled "Folder Profile." 1 page with one enclosure. (F2001-00630)
 - A. Letter to the Honorable Francis Blake, Deputy Secretary, from Mark A. Frevert, Vice Chairman, Enron Corporation, dated September 26, 2001. 1 page. (F2001-00630)
42. Memorandum to Robert Fisher, CH, from Michael P. Hoffman, Office of the Assistant General Counsel for Technology Transfer and Intellectual Property, dated December 2, 1999. 1 page with one enclosure. (F2001-00630)
 - A. Undated document entitled "Statement of Considerations." 3 pages. (F2001-00630)
43. Letter to Patricia Hoffman, Director, Advanced Turbine Systems, Office of Industrial Technologies, from Paul A Gottlieb, Assistant General Counsel for Tech Transfer and Intellectual Property. 1 page. (F2001-00630)
44. Memorandum to Mark Dvorscak, Assistant General Counsel, from Lisa A. Jarr, Patent

Counsel, Federal Energy Technology Center, dated June 30, 1999. 1 page with one enclosure. (F2001-00630)

A. Undated document entitled "United States Department of Energy, Petition for Advance Waiver of Patent Rights Under 10 CFR 784." (pages 2,4, and 6, omitted, best copy available in file.) 19 pages. (F2001-00630)

45. Memorandum to Mark Dvorscak, Assistant Chief Counsel, from Lisa A. Jarr, Patent Counsel, dated June 30, 1999. 1 page with one enclosure. (F2001-00630)

A. Undated document entitled "United States Department of Energy, Petition for Advance Waiver of Patent Rights Under 10 CFR 784." 17 pages. (F2001-00630)

46. Memorandum to Mark Dvorscak, Assistant General Counsel, from Lisa A. Jarr, Patent Counsel, dated June 30, 1999. 1 page with one enclosure. (F2001-00630)

A. Undated document entitled "United States Department of Energy, Petition for Advance Waiver of Patent Rights Under 10 CFR 784." 14 pages. (F2001-00630)

47. E-mail to Katherine Baldwin, from Mark Dvorscak, dated July 14, 1999. Subject: Request for Advanced Waiver Number. 1 page. (F2001-00630)

48. E-mail to Carol Balassa from Harvetta Asamoah, dated July 5, 2002. Subject: Draft Talking Points on Enron and California. 1 page with one enclosure. (F2001-00630)

A. Draft document entitled "Enron Q& A," dated July 5, 2002. 6 pages. (F2001-00630)

49. E-mail to Carol Balassa from Harvetta Asamoah, dated July 3, 2002. Subject: Financial Times: US to seek more open regulation of services WTO talks. Information withheld under Exemption 5. 2 pages.

50. E-mail to Melly from Harvetta Asamoah, dated June 14, 2002. Subject: Congress May Repeal 1935 Utility Governance Law. Information withheld under Exemption 5. 6 pages. (F2001-00630)

51. E-mail to Carol Balassa from Harvetta Asamoah, dated May 29, 2002. Subject: Troubled US Energy Companies Pull Out of Europe. Information withheld under Exemption 5. 2 pages. (F2001-00630)

52. E-mail to Carol Balassa from Harvetta Asamoah, dated May 17, 2002. Subject: Privatization Efforts in Mexico Face Ongoing Obstacles; Opportunities Impacted. Information withheld under Exemption 5. 4 pages. (F2001-00630)

53. E-mail to Carol Balassa from Harvetta Asamoah, dated April 25, 2002. Subject: National

Grid Merger: The British are coming. Information withheld under Exemption B5. 4 pages. (F2001-00630)

54. E-mail to Carol Balassa from Harvetta Asamoah, dated April 25, 2002. Subject: Coalition call for transparency in U.S. energy markets. Information withheld under Exemption B5. 4 pages. (F2001-00630)
55. E-mail to Carol Balassa from Harvetta Asamoah, dated March 15, 2002. Subject: Report on New York v. FERC. 2 pages. (F2001-00630)
56. E-mail to Carol Balassa from Michelle Billing, dated March 13, 2002. Subject: Re: Talking Points on Enron's collapse for GATS Energy Services Meeting. Information withheld under Exemption 5. 2 pages with one enclosure. (F2001-00630)
 - A. Undated document entitled "Enron Q & A." Information withheld under Exemption 5. 1 page. (F2001-00630)
57. E-mail to Harvetta Asamoah, from Melly, dated March 13, 2002. Subject: Re: Halliburton meeting notes. Information withheld under Exemption B5. 1 page. (F2001-00630)
58. Document entitled "Meeting with Halliburton," dated March 12, 2002. Information withheld under Exemption 4 and 5. 2 pages. (F2001-00630)
59. E-mail to Carol Balassa from Harvetta Asamoah, dated March 5, 2002. Subject: New York v. FERC. Information withheld under Exemption 4 and 5. 3 pages. (F2001-00630)
60. E-mail to Harvetta Asamoah from David Pumphrey, dated March 13, 2002. Subject: Re: Talking Points on Enron's collapse for GATS Energy Services Meeting. Information withheld under Exemption 5. 1 page. (F2001-00630)
61. E-mail to Carol Balassa from Harvetta Asamoah, dated March 13, 2002. Subject: Re: Talking points on Enron's collapse for GATS Energy Services Meeting. Information withheld under Exemption B5. 1 page with one enclosure. (F2001-00630)
 - A. Undated document entitled "Q & A." Information withheld under Exemption 5. 1 page. (F2001-00630)
62. E-mail to D. Downes from Carol Balassa, dated March 13, 2002. Subject: Talking points on Enron's collapse. 1 page with one enclosure. (F2001-00630)
 - A. Undated document entitled "Enron Q & A." Information withheld under Exemption 5. 1 page. (F2001-00630)
63. E-mail to Carol Balassa from Harvetta Asamoah, dated February 22, 2002. Subject: Economist Article Pro Liberation. 1 page. (F2001-00630)

64. E-mail to Carol Balassa from Harvetta Asamoah, dated February 20, 2002. Subject: Enron Collapse/Energy Markets: FERC Testimony. 2 pages. (F2001-00630)
65. Document entitled "Testimony of Pat Wood, III, Chairman, Federal Energy Regulatory Commission, Before the Committee on Energy and Natural Resources, United States Senate," dated January 29, 2002. 13 pages. (F2001-00630)
66. Document entitled "Summary of Testimony of Pat Wood, III Chairman, Federal Energy Regulatory Commission Before the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce United States House of Representatives," dated February 13, 2002. 22 pages. (F2001-00630)
67. E-mail to D. Downes from Carol Balassa, dated February 20, 2002. Subject: Followup to today's meeting. Information withheld under Exemption 5. 1 page. (F2001-00630)
68. E-mail to Carol Balassa from Richard Larm, dated February 1, 2002. Subject: Re: Revised Duke Energy Int'l Service Listing - Reply. Information withheld under Exemption 5. 3 pages. (F2001-00630)
69. E-mail to Carol Balassa from Melly, dated February 1, 2002. Subject: Re: Revised Duke Energy Institute. Information withheld under Exemption 5. 3 pages. (F2001-00630)
70. E-mail to Carol Balassa from Lana Ekimoff, dated January 31, 2002. Subject: enron. 1 page. (F2001-00630)
71. Document entitled "Lawrence Makovich's Testimony to the U.S. Senate Committee on Energy and Natural Resources," dated January 29, 2002. 7 pages. (F2001-00630)
72. E-mail to Lana Ekimoff from Harvetta Asamoah, dated December 13, 2001. Subject: Enron looms over House electricity deregulation. 2 pages. (F2001-00630)
73. E-mail to Carol Balassa from Harvetta Asamoah, dated November 30, 2001. Subject: Enron collapse will not affect Texas retail power market liberalisation. Information withheld under Exemption 5. 3 pages. (F2001-00630)
74. E-mail to Carol Balassa from Harvetta Asamoah, dated December 4, 2001. Subject: Enron demise will not stall EU power trade-Palacio. Information withheld under Exemption 5. 1 page. (F2001-00630)
75. Document entitled "United States of America Before the Federal Energy Regulatory Commission," dated June 3, 2002. Information withheld under Exemption 5. 9 pages. (F2001-00630)
76. Undated document entitled "Xonon, No NOx Combustion." 59 pages. (F2001-00630)

77. News Release entitled "Catalytica and General Electric Agree to Commercialize Xonono in Gas Turbines," dated November 19, 1998. 2 pages. (F2001-00630)
78. News Release entitled "First Gas Turbine with Catalytica's Xonon Installed to Produce Electricity at a Utility," dated October 8, 1998. 2 pages. (F2001-00630)
79. Letter to the Commissioner of Patents and Trademarks from Richard E. Constant, Assistant General Counsel for Patents, dated January 27, 1992. 1 page. (F2001-00630)
80. Document entitled "Confirmation Instrument," dated December 4, 1991. 1 page. (F2001-00630)
81. Document entitled "Contract No. DE-AC 08486ER80421, Page 5 of 6." 1 page. (F2001-00630)
82. Undated document entitled "DOE PR 9-9. 103-3 Patent Indemnity (Jun 1979)." 4 pages. (F2001-00630)
83. Undated document entitled "Confirmatory Instrument." 1 page. (F2001-00630)
84. Undated document entitled "Contract No. DE-AC086ER80421," Page 5 of 6. 1 page. (F2001-00630)
85. Undated document entitled "DOE PR 9-9. 103-3 Patent Indemnity (June 1979)." 4 pages. (F2001-00630)
86. E-mail to David Katz from Harvetta Asamoah, dated September 25, 2001. Subject: Re: Returns in Kind in SingaporeFTA. Information withheld under Exemption 5. 2 pages. (F2001-00630)
87. E-mail to David Katz from Harvetta Asamoah, dated September 25, 2001. Subject: Re: Returns in Kind in Singapore FTA. Information withheld under Exemption 5. 2 pages. (F2001-00630)
88. E-mail to Carol Balassa from Harvetta Asamoah, dated September 17, 2001. Subject Re: Objectives. Information withheld under Exemption 5. 3 pages. (F2001-00630)
89. E-mail to Pamela Cochran from Melly, dated August 16, 2001. Subject: Re: Objectives. Information withheld under Exemption 5. 3 pages. (F2001-00630)
90. E-mail to Melly from Harvetta Asamoah, dated August 16, 2001. Subject: RE: Objectives. Information withheld under Exemption 5. 2 pages. (F2001-00630)
91. E-mail to Harvetta Asamoah from Melly, dated August 16, 2001. Subject: RE: Objectives.

Information withheld under Exemption 5. 3 pages. (F2001-00630)

92. E-mail to Melly from Harvetta Asamoah, dated August 16, 2001. Subject: RE: Objectives. Information withheld under Exemption 5. 2 pages. (F2001-00630)
93. E-mail to Harvetta Asamoah from Evelyn Wheeler, dated August 15, 2001. Subject: RE: Objectives. Information withheld under Exemption 5. 2 pages. (F2001-00630)
94. E-mail to Harvetta Asamoah from Melly, dated August 15, 2001. Subject: fwd: Objectives. Information withheld under Exemption 5. 2 pages. (F2001-00630)
95. Undated document entitled "Expanding Trade and Investment in Energy and Energy Services: Key Objectives of WTO Negotiation." 1 page. (F2001-00630)
96. E-mail to Harvetta Asamoah from Carol Balassa, dated June 25, 2001. Subject: RE: North American CEC and Mark Warner's Request. Information withheld under Exemption 5. 2 pages. (F2001-00630)
97. E-mail to Pamela Cochran from Carol Balassa, dated March 15, 2001. Subject: Re: Carol's whereabouts. Information withheld under Exemption 5 and 6. 2 pages (F2001-00630)
98. E-mail to Harvetta Asamoah from David Downes, dated March 15, 2001. Subject: Re: California Energy Crisis-GATS. Information withheld under Exemption 5. 1 page. (F2001-00630)
99. E-mail to Melly from Harvetta Asamoah, dated March 15, 2001. Subject: RE: Re: Canadian energy (oil and gas) proposal. Information withheld under Exemption 5. 2 pages. (F2001-00630)
100. E-mail to Lana Ekimoff from Harvetta Asamoah, dated March 15, 2001. Subject: FW: California Energy Crisis-GATS. Information withheld under Exemption 5. 1 page. (F2001-00630)
101. Undated e-mail to Tom Briggs from Lora Sullivan. Subject: California Energy Crisis. 3 pages. (F2001-00630)
102. E-mail to Melly from Harvetta Asamoah, dated January 31, 2001. Subject: Background on Enron's Business. 11 pages. (F2001-00630)
103. E-mail to Melly from Harvetta Asamoah, dated January 19, 2001. Subject: FW: Energy Services Ref. Paper comments. Information withheld under Exemption 5. 2 pages. (F2001-00630)
104. E-mail to David Pumphrey from Harvetta Asamoah, dated January 12, 2001. Subject: Re: Mark Warner. Information withheld under Exemption 5. 2 pages. (F2001-00630)

105. E-mail to Harvetta Asamoah from David Katz, dated September 25, 2001. Subject: Re: Returns in Kind in Singapore FTA. Information withheld under Exemption 5. 3 pages. (F2001-00630)
106. E-mail to Whit Warthin from Carol Balassa, dated July 11, 2002. Subject: Enron Talking Points. Information withheld under Exemption 5. 1 page with one enclosure. (F2001-00630)
 - A. Undated document entitled "Enron "Q & A." Information withheld under Exemption 5. 6 pages. (F2001-00630)
107. E-mail to Carol Balassa from Harvetta Asamoah, dated July 11, 2002. Subject: RE: Draft Talking Points on Enron and California. Information withheld under Exemption 5. 1 page with one enclosure.
 - A. Undated document entitled "Enron 'Q & A.'" Information withheld under Exemption 5. 6 pages. (F2001-00630)
108. Undated document entitled "Portland General Electric." Information withheld under Exemption 5. 6 pages. (F2001-00630)
109. Letter to U.S. Department of Energy from Stephen M. Quennoz, Vice President, Nuclear and Thermal Operations, dated September 26, 2000. 1 page. (F2001-00630)
110. Facsimile Transmission Form to Mike Henke from Jane Taylor, dated October 25, 2000. 1 page. (F2001-00630)
111. Letter to The Honorable Denise L. Cote, United States District Court, Southern District of New York, from Michael J. Henke, Counsel for Portland General Electric Company and the City of Eugene, Oregon, dated May 30, 2001. 1 page. (F2001-00630)
112. Letter to Edwin M. Marshall, U.S. Department of Energy, from Stephen M. Quennoz, Vice President Nuclear and Thermal Operations, dated November 3, 1998. 1 page. (F2001-00630)
113. Document entitled "In the United States District Court for the District of Columbia, dated March 12, 1999." 34 pages. (F2001-00630)
114. Undated and untitled dark sheet. 1 page. (F2001-00630)
115. Undated document entitled "Table of Contents." 1 page. (F2001-00630)
116. Undated document entitled "Table of Authorities." 3 pages. (F2001-00630)
117. Undated document entitled "In the United States Court of Federal Claims." 28 pages.

(F2001-00630)

118. Undated document entitled "Enron Memos Q & A." Information withheld under Exemption 5. 1 page. (F2001-00630)
119. Letter to the Honorable Elizabeth A. Moler, Chair, Federal Energy Regulatory Commission, Office of the Chair, from Robert R. Nordhaus, General Counsel, dated October 30, 1996. 1 page with one enclosure. (F2001-00630)
 - A. Undated document entitled "[6450-01-P], Department of Energy, Office of the Secretary, Federal Energy Regulatory Commission, Relating to Certain Authorizations to Export Electricity and Construct and Operate Related Facilities." 7 pages. (F2001-00630)
120. Memorandum to Douglas Smith, Deputy General Counsel for Energy Policy, from Michael T. Skinker, Staff Attorney, dated October 23, 1996. Information withheld under Exemption 5. 1 page. (F2001-00630)
121. Undated draft memorandum to Doug Smith, Associate General for Energy Policy from Michael T. Skinne, Staff Attorney. Information withheld under Exemption B5. 14 pages. (F2001-00630)
122. Undated drat document entitled "Review for Clean Air Policy's Paper Entitled: Emission Impacts of Increased Energy Exports From the American Electric Power (AEP) System." 19 pages. (F2001-00630)
123. Undated document entitled "United States of America Before the Department of Energy. Enron Power Marketing, Inc. FE Docket No. EA-102A, El Paso Electric Company FE Docket No. EA-48-1." 7 pages. (F2001-00630)
124. Undated document entitled "In the United States Bankruptcy Court for the Northern District of Texas Abilene Division. In Re West Texas Marketing Corporation Debtor. Case No. 182-00034-7, Order Approving Trustee's Final Report." 1 page. (F2001-00630)
125. Undated document entitled "In the United States Bankruptcy Court for the Northern District of Texas Abilene Division. In Re West Texas Marketing Corporation Case No. 182-00034-7, Debtor, Order Granting Trustee's Final Application for Compensation." 1 page. (F2001-00630)
126. Undated document entitled "In the United States Bankruptcy Court for the Northern District of Texas Abilene Division. In Re West Texas Marketing Corporation Debtor, Case No. 182-00034-7 Order On Final Application of Gardere & Wynne, L.L.P., Attorneys for Trustee, for Compensation and Expenses." 1 page. (F2001-00630)
127. Undated document entitled "In the United States Bankruptcy Court For the Northern

District of Texas Abilene Division In Re: West Texas Marketing Corporation Debtor Case No. 182-00034-7." 1 page. (F2001-00630)

128. Undated document entitled "In the United States Bankruptcy Court For the Northern District of Texas Abilene Division In Re: West Texas Marketing Corporation Debtor Case No. 182-00034-7. Order Authorizing Employment of Yarmchuck & Associates, Inc. Nunc Pro Tunc and Allowing Fees and Expenses of Same." 1 page. (F2001-00630)
129. Undated document entitled "United States Bankruptcy Court For the Northern District of Texas Abilene Division In Re: West Texas Marketing Corporation Debtor Case No. 182-00034-7. Order Authorizing Employment of Ann Ross NUNC PRO TUNC and Allowing Fees and Expenses of Same." 1 page. (F2001-00630)
130. Document entitled "United States Department of Energy Office of Fossil Energy Washington, D.C. FE Docket No. EA-102 Enron Power Marketing, Inc. Electricity Export Authorization Order Authorizing Electricity Export to Mexico Order No. EA-102," dated February 6, 1996. 10 pages. (F2001-00630)
131. Draft document entitled "[6450-10-P] Department of Energy Office of the Secretary Federal Energy Regulatory Commission Relating to Certain Authorizations To Export Electricity and Construct and Operate Related Facilities," dated October 27, 1996. 3 pages. (F2001-00630)
132. Undated document entitled "Department of Energy Delegation Order No. 0204 - To The Federal Energy Regulatory Commission." 1 page. (F2001-00630)
133. Letter to Commissioner of Patents and Trademarks Washington, D.C., from Richard W. Constant, Assistant General Counsel for Patents, dated January 27, 1992. 1 page. (F2001-00630)
134. Document entitled "United States of America Federal Energy Regulatory Commission Before Commissioners: Elizabeth Anne Moler, Chair; Vicky A. Bailey, James J. Hoecker, William L. Massey, and Donald F. Santa, Jr. Enron Power Marketing, Inc. v. El Paso Electric Company Docket No. EL 96-74-000. Order on Complaint," dated October 4, 1996. 15 pages. (F2001-00630)
135. Undated facsimile to Bob Nordhaus from Betsey Moler. 1 page. (F2001-00630)
136. Undated document entitled "Tab 1 Executive Orders." 1 page with five enclosures. (F2001-00630)
 - A. Undated document entitled "Enron Complaint EL96-74-00 Legislative Materials." 1 page. (F2001-00630)
 - B. Document entitled "E. O. 8201, Title 3 - The President." 1 page. (F2001-00630)

- C. Undated document entitled "Chapter 10 - Energy." 1 page. (F2001-00630)
 - D. Undated document entitled "Codification of Presidential Proclamations and Executive Orders." 1 page. (F2001-00630)
 - E. Undated document entitled "Chapter 10 - Energy." 1 page. (F2001-00630)
137. Undated document entitled "Tab 2 DOE Organization Act." 1 page with six enclosures.. (F2001-006630)
- A. Document entitled "Public Law 95-91-August 4, 1977." 1 page. (F2001-00630)
 - B. Undated document entitled "Legislative History P.L. 95-91." 1 page. (F2001-00630)
 - C. Undated document entitled "Energy Organization Act, P.L. 95-91." 1 page. (F2001-00630)
 - D. Undated document entitled "Energy Organization Act P.L. 95-91 [page 81] Estimated Cost of the Legislation." 1 page. (F2001-00630)
 - E. Undated document entitled "Legislative History, P.L. 95-91 [page 75]." 1 page. (F2001-00630)
 - F. Undated document entitled "Energy Organization Act P.L. 95-91 [page 76]." 1 page. (F2001-00630)
138. Undated document entitled "TAB 3 DOE Regulations." 1 page with one enclosure. (F2001-00630)
- A. Undated document entitled "Department of Energy.205.300." 8 pages. (F2001-00630)
139. Undated document entitled "Tab 4 DOE Legislative History." 1 page with twelve enclosures. (F2001-00630)
- A. Document entitled "Section 201 (c)." 1 page. (F2001-00630)
 - B. Document entitled "H.R. 5423. In The House of Representatives," dated February 6, 1935. 2 pages. (F2001-00630)
 - C. Document entitled "Federal Power Commission National Power Survey Congress Session S. 1725 In the Senate of The United States," dated February 6, 1935. 2 pages. (F2001-00630)

- D. Document entitled "1 MY [Confidential Committee Print], dated S.1725." 3 pages. (F2001-00630).
- E. Document entitled "74th Congress 1st Session S. 2796 In The Senate of the United States," dated May 7 (calendar day, May 9), 1935. 4 pages. (F2001-00630)
- F. Undated draft memorandum to Mr. McKernan from Francis J. Walsh. 4 pages. (F2001-00630)
- G. Undated document entitled "Section 202 (e)." 6 pages. (F2001-00630)
- H. Undated document entitled "Section 202 (f)." 1 page. (F2001-00630)
- I. Undated document entitled "U.S. Congress, Senate Committee on Interstate and Foreign Commerce. Amending section 202 of the Federal Power Act ... Rept....S. 1441. (Sen. Rept. 513, 83/1 Cong.)." 17 pages. (F2001-00630)
- J. Undated document entitled "Tab 5, Memo 202 (F)." 1 page. (F2001-00630)
- K. Letter to The Honorable Stephen Wakefield General Counsel Department of Energy, from David N. Cook, Deputy General Counsel, Federal Energy Regulatory Commission, dated November 19, 1990. 1 page. (F2001-00630)
- L. Letter to The Honorable Stephen Wakefield, General Counsel, from William S. Scherman, General Counsel, Federal Energy Regulatory Commission, dated November 19, 1990. 1 page. (F2001-00630)
- M. Undated document entitled "The Impact of a Potential United States/Mexico Free Trade Agreement on FERC Jurisdiction Over Texas Utilities." Information withheld under Exemption 5. 16 pages with one enclosure. (F2001-00630)
 - A. Document entitled "Attachment." Information withheld under Exemption 5. 2 pages. (F2001-00630)
- 140. Memorandum to Mary Anne Sullivan General Counsel, Eric Fygi, General Counsel, Mark S. Schwartz, Deputy General Counsel for Energy Policy, and Lawrence A. Gollump, Deputy General Counsel for Regulatory Intervention and Power Marketing, from Harvard P. Spigal, General Counsel, Department of Energy, Bonneville Power Administration. 1 page. (F2001-00630)
- 141. Draft Document entitled "United States of America Federal Energy Regulatory Commission Before Commissioners: Enron Power Marketing, Inc. v. United States Department of Energy - Bonneville Power Administration Docket No. EL99-51-000 Docket Nos. EL-99-49-000 and NJ97-3-006." 8 pages. (F2001-00630)

142. Facsimile Transmittal to Stephany Watson, Steve Larson Harvey Spiegel, Bonneville Power Administration, from Adelia Borrasca, Heller Ehrman White & McAuliffe. 1 page with one enclosure. (F2001-00630)
 - A. Document entitled "AIMS Document Ticket," dated November 24, 1999. 1 page. (F2001-00630)
143. Document entitled "Folder Profile." 1 page with four enclosures. (F2001-00630)
 - A. Undated draft memorandum to the Secretary from Dan W. Reicher, Assistant Secretary, Energy Efficiency and Renewable Energy. Information withheld under Exemption 5. 2 pages. (F2001-00630)
 - B. Undated draft letter to The Honorable Carlos Flores Facusse, President Republic of Honduras, from Bill Richardson. Information withheld under Exemption 5. 1 page. (F2001-00630)
 - C. Undated document entitled "Enron Wind Honduras Project Talking Points." Information withheld under Exemption 5. 1 page. (F2001-00630)
 - D. Undated document entitled "CIA—The World Factbook 1999—Honduras [Country Listing] Factbook Home Page]. " 7 pages. (F2001-00630)
144. Facsimile Cover Sheet to Dan Reicher, Assistant Secretary for Efficiency and Renewables, from Hap Boyd, Enron, Washington, dated October 15, 1999. 1 page with 2 enclosures. (F2001-00630)
 - A. Memorandum to Hap Boyd, Enron from Rafael Alcalde -Navarro, Enron Wind Development Corporation, dated October 8, 1999. 1 page. (F2001-00630)
 - B. Document entitled "Honduras 2000 60 MW Wind Electric Generation Plant." 3 pages. (F2001-00630)
145. Memorandum to The Secretary of Energy from Dan W. Reicher, Assistant Secretary, Energy Efficiency and Renewable Energy, dated December 17, 1999. Information withheld under Exemption 5. 2 pages with one enclosure. (F2001-00630)
 - A. Note to Linda from Travis, dated January 19, 2000. 1 page. (F2001-00630)
146. E-mail to Ruth Mosby EE, from Dreda Perry, EE, dated March 13, 2000. Subject: Enron Request for Secretarial letter. 1 page. (F2001-00630)
147. E-mail to Ruth Mosby EE, from Jack Cardogan, dated May 16, 2000. Subject: Enron Letter. 1 page. (F2001-00630)
148. E-mail to Ruth Mosby, EE, from Jack Cardogan, dated May 23, 2000. Subject: Status of

Enron Request. 1 page. (F2001-00630)

149. E-mail to Paul Carrier from Frank Lindh, dated February 2, 2001. Subject: PG&E: Weekly Report to DOE. 2 pages with three enclosures. (F2001-00630)
 - A. Document entitled "Pacific Gas and Electric Company Gas Procurement Department of Energy Order Report," dated January 19, 2001. 1 page. (F2001-00630)
 - B. Document entitled "Pacific Gas and Electric Company Gas Procurement Department of Energy Order Report," dated January 31, 2001. 1 page. (F2001-00630)
 - C. Undated document entitled "Noncompliance Cumulative Recap for the reporting period 1/19/01-1/31/01. 1 page. (F2001-00630)
150. Letter to Mary Ann Sullivan, General Counsel, from Walter E. Pollock, Senior Vice President, Power Supply Portland General Electric Company, dated December 28, 2000. 1 page. (F2001-00630)
151. Letter to Mr. Terry Winter, President, California Independent System Operator, from Mary Anne Sullivan, General Counsel, dated December 22, 2000. 1 page. (F2001-00630)
152. Letter to Mary Anne Sullivan, General Counsel, from Walter E. Polluck, Senior Vice President Power Supply, Portland General Electric Company, dated December 21, 2000. 1 page. (F2001-00630)
153. Document entitled "Order Pursuant to Section 202 (c) of the Federal Power Act," signed by Bill Richardson, Secretary of Energy, dated December 14, 2000. 3 pages. (F2001-00630)
154. Undated document entitled "Organization." 11 pages. (F2001-00630)
155. Facsimile to Mary Anne Sullivan from Walt Pollock, dated December 21, 2000. 1 page. (F2001-00630)
156. Note to Ted Pullian, General Counsel, from Michael Whatley, dated April 5, 2001. 1 page with one enclosure. (F2001-00630)
 - A. Draft document entitled "Section 1. Short Title," dated April 1, 2001. 4 pages. (F2001-00630)
157. Letter to The Honorable Ron Wyden, United Senate, from Steven J. Kean, Executive Vice President and Chief of Staff, Enron Corporation, dated February 26, 2001. 2 pages. (F2001-00630)

158. Undated document entitled "Improving the Efficiency of U.S. Bulk Power Markets Through the Release of Market Data." 2 pages. (F2001-00630)
159. Memorandum to Mark Friedrichs, PO, John Conti, PO, and Lot Cook, GC, from Ted Pullian, GC, dated April 6, 2001. 1 page. (F2001-00630)
 - A. Memorandum to Rogert Seifert, BPA, Tim Meeks, WLO, and Loy Kirkpatrick, GC, from Ted Pulliam, General Counsel, dated April 6, 2001. 1 page. (F2001-00630)
 - B. Draft document entitled "Section 1. Short Title," dated April 1, 2001. 4 pages. (F2001-00630)
160. Letter to The Honorable Ron Wyden, United States Senate, from Steven J. Kean, Executive Vice President and Chief of Staff, Enron Corporation, dated February 26, 2001. 2 pages with one enclosure. (F2001-00630)
 - A. Undated document entitled "Improving the Efficiency of U.S. Bulk Power Markets Through The Release of Market Data." 2 pages. (F2001-00630)
161. Memorandum to Mark Friedrichs, PO, John Conti, PO, and Lot Cook, GC, from Ted Pulliam, GC, dated April 6, 2001. 1 page with one enclosure. (F2001-00630)
 - A. Memorandum to Roger Seifert, BPA, Tim Meeks, WLO, and Loy Kirkpatrick, from Ted Pulliam, GC, dated April 6, 2001. 1 page. (F2001-00630)
162. E-mail to Edward Pulliam from Lot Cooke, dated April 6, 2001. Subject: RE: Draft: Legislation on ISO Providing Information. 1 page. (F2001-00630)
163. E-mail to Edward Pulliam from Tracy Terry, dated April 6, 2001. Subject: Comments on ISO Legislation. 1 page with two enclosures. (F2001-00630)
 - A. Undated Memorandum to Ted Pulliam, GC, from Tracy Terry, PO. 1 page. (F2001-00630)
 - B. Document entitled "Western Area Power Administration," dated April 8, 2001. 2 pages. (F2001-00630)
164. Document entitled "Office of General Counsel Southwestern Power Administration Comments on Proposed "Electricity Information Disclosure, Efficiency and Accountability Act," dated April 9, 2001. 2 pages. (F2001-00630)
165. E-mail to Edward Pulliam from Roger Seifert, dated April 9, 2001. Subject: FW: Electricity Information Disclosure Act. 2 pages. (F2001-00630)

166. Note to Ted Pulliam from Loy Kirkpatrick, dated April 9, 2001. Subject: Re: Request to Review Legislation to Require System Operators to Supply System Information. 2 pages. (F2001-00630)
167. Memorandum to Roger Seifer BPA, Tim Meeks, WLO, and Loy Kirkpatrick, GC, from Ted Pulliam, dated April 6, 2001. 1 page with one enclosure. (F2001-00630)
 - A. Draft document entitled "Section 1. Short Title," dated April 1, 2001. 4 pages. (F2001-00630)
168. Letter tot The Honorable Ron Wyden, United States Senate, from Steven J. Ken, Executive Vice President and Chief of Staff, Enron Corporation, dated February 26, 2001. 2 pages. (F2001-00630)
169. Undated document entitled "Improving the Efficiency of U.S. Bulk Power Markets Through The Release of Market Data." 2 pages. (F2001-00630)
170. Undated document entitled "Chapter 12 Regulation of Power 794,795. Omitted. Historical and Statutory Notes." 22 pages. (F2001-00630)
171. E-mail to Roger Seifert from Edward Pulliam, dated April 9, 2001. Subject: Draft "Electricity Information Disclosure, Efficiency and Accountability Act." 3 pages. (F2001-00630)
172. E-mail to Edward Pulliam from Lot Cooke, dated April 10, 2001. Subject: RE: Draft "Electricity Information Disclosure, Efficiency and Accountability Act." 1 page. (F2001-00630)
173. E-mail to Edward Pulliam from Roger Seifert KN-DC, dated April 10, 2001. Subject: "Enron/" Draft Bill.
174. E-mail to Edward Pulliam from Tracy Terry, dated April 10, 2001. Subject: RE: Draft "Electricity Information Disclosure, Efficiency and Accountability Act." 1 page. (F2001-00630)
175. Document entitled "Commission Opinions, Orders and Nations." 1 page. (F201-00630)
176. E-mail to Tracy Terry from Edward Pulliam, dated April 10, 2001. Subject: Draft "Electricity Information Disclosure, Efficiency and Accountability Act." 3 pages. (F2001-00630)
177. E-mail to Tracy Terry from Edward Pulliam, dated April 10, 2001. Subject: RE: Draft Bill. 3 pages. (F2001-00630)
178. Undated e-mail to Michael Whatley from Edward Pulliam. 3 pages. (F2001-00630)

179. E-mail to Tracy Terry from Edward Pulliam, dated April 10, 2001. Subject: RE: Draft Bill. 3 pages. (F2001-00630)
180. E-mail to Michael Whatley from Edward Pulliam, dated April 10, 2001. Subject: Re: Electricity Information Disclosure Act. 3 pages. (F2001-00630)
181. E-mail to Edward Pulliam from Michael Whatley, dated May 8, 2001. Subject: Enron Bill Analysis. 1 page. (F2001-00630)
182. E-mail to Michael Whatley from Edward Pulliam, dated May 9, 2001. Subject: FW: RE: Electricity Information Disclosure Act. 3 pages. (F2001-00630)
183. Letter to Paul Detwiler, Department of Energy, from Terry M. Winter, President and Chief Executive Officer, California ISO, dated February 2, 2001. 1 page. (F2001-00630)
184. Undated document entitled "DOE Certification Day." 1 page. (F2001-00630)
185. Letter to Paul Carrier, Office of Energy Emergencies, from Jim Detmers, Managing Director of Operations California ISO, dated January 26, 2001. 1 page with three enclosures. (F2001-00630)
 - A. Document entitled "Document Contains Proprietary Information, Attachment 'A' Caiso Forecasted Excess Energy for FPA Certification for January 25, 2001," dated January 25, 2001. Information withheld under Exemption 4. 1 page. (F2001-00630)
 - B. Document entitled "Attachment B "DOE Excess" and Out-of-Market Delivers. Document Contains Proprietary Information," dated January 25, 2001. Information withheld under Exemption 4. 4 pages. (F2001-00630)
 - C. Undated document entitled "Attachment C. Caiso Control Area of Generator Output Document contains Proprietary Information." Information withheld under Exemption 4. 1 page. (F2001-00630)
186. Letter to Paul Carrier Department of Energy, from Jim Detmers, Managing Director of Operations California ISO, dated January 27, 2001. 1 page with three enclosures. (F2001-00630)
 - A. Document entitled "Attachment 'A' Caiso Forecasted Excess Energy for DPA Certification for January 26, 2001." Information withheld under Exemption 4. 1 page. (F2001-00630)
 - B. Document entitled "Attachment B "DOE Excess" and Out of Market Deliveries." Information withheld under Exemption 4. 1 page. (F2001-00630)

- C. Document entitled "Attachment C. Caiso Control Area of Generator Output." 1 page. (F2001-00630)
187. Letter to Paul Carrier, Department of Energy, from Jim Deters, Managing Director of Operations, California ISO, dated January 28, 2001. 1 page with three enclosures. (F2001-00630)
- A. Document entitled "Attachment "A" Caiso Forecasted Excess Energy for FPA Certification for January 27, 2001." 1 page. (F2001-00630)
 - B. Document entitled "Attachment B "DOE Excess" and Out of Market Deliveries." Information withheld under Exemption 4. 3 pages. (F2001-00630)
 - C. Document entitled "Attachment C. CAISO Control Area of Generator Output Document Contains Proprietary Information. QF Generation." 1 page. (F2001-00630)
188. Document entitled "Certification of the California Independent System Operator January 26, 2001 for January 27, 2001," dated January 26, 2001. 2 pages. (F2001-00630)
189. Undated document entitled "Analysis of Load Forecast, Resource Availability Forecast, and Transmission System Conditions that Call for Certification," Information withheld under Exemption 4. 4 pages. (F2001-00630)
190. Document entitled "Certification of the California Independent System Operator January 27, 2001 for January 28, 2001. 2 pages. (F2001-00630)
191. Undated document entitled document "Analysis of Load Forecast, Resource Availability Forecast, and Transmission System Conditions that Call for Certification." Information withheld under Exemption 4. 4 pages with one attachment.
- A. Document entitled "Attachment A," dated January 25, 2001. 1 page. (F2001-00630)
192. Undated document entitled "Certification of the California Independent System Operator January 28, 2001 for January 29, 2001." 2 pages. (F2001-00630)
193. Undated document entitled "Analysis of Load Forecast, Resource Availability Forecast, and Transmission System Conditions that Call for Certification." Information withheld under Exemption 4. 4 pages with one enclosure. (F2001-00630)
- A. Document entitled "Attachment A Resources Required for January 29, 2001." 1 page. (F2001-00630)
194. Document entitled "Certification of the California Independent System Operator January 28, 2001 for January 29, 2001." 2 pages. (F2001-00630)

195. Document entitled "Analysis of Load Forecast, Resource Availability Forecast, and Transmission System Conditions that Call for Certification," dated January 28, 2001. Information withheld under Exemption 4. 4 pages. (F2001-00630)
196. Document entitled "Temporary Emergency Natural Gas Purchase and Sale Order," dated January 19, 2001. 2 pages with two enclosures. (F2001-00630)
 - A. Memorandum to the Secretary of Energy, from William Clinton, President of the United States, White House, dated January 19, 2001. 2 pages. (F2001-00630)
 - B. Document entitled "Attachment B Pacific Gas and Electric Company Gas Procurement Natural Gas Supplies." 2 pages. ((F2001-00630)
197. Document entitled "United States of America Before the Department of Energy. Emergency Request Reliant Energy Services, Inc. And Reliant California Generators For Expedited Action On Rehearing Regarding Order Pursuant to Section 202 (c) of the Federal Power Act," dated January 11, 2001. 6 pages with one enclosure. (F2001-00630)
 - A. Undated and untitled Addressee list. 9 pages. (F2001-00630)
198. Document entitled "United States District Court for the District of Columbia Portland General Electric Company and City of Eugene, Oregon, acting by through the Eugene Water and Electric Board v. United States of America and the United States Department of Energy, individually and as successor to the United States Atomic Energy Commission, and the Energy Research and Development Administration. Summons in a Civil Case Number 1:98CV02552 Judge: William B. Bryant Deck Type: Civil General, dated October 22, 1998. 1 page. " (F2001-00630)
199. Document entitled "In the United States District Court for the District of Columbia." 30 pages. (F2001-00630)
200. Document entitled "In the United States District Court for the District of Columbia. Portland General Electric Company (an Oregon corporation) and the City of Eugene, Oregon, acting by and through the Eugene Water and Electric Board, a municipal corporation of the State of Oregon, Plaintiffs, v. United States of America and the United States Department of Energy individually and as successor to the United States Atomic Energy Commission, and the Energy Research and Development Administration. Certificate Pursuant to Local Rule 109. Case Number 1:98CV02552 Judge: William B. Bryant Deck Type: Civil General," dated October 22, 1998. 2 pages. (F2001-00630)
201. Document entitled "Enron Corp.and Subsidiary Companies," dated October 19, 1998. 25 pages. (F2001-00630)
202. Document entitled "In the United States Court of Federal Claims. Portland General

Electric Company, Plaintiffs, v. The United States, Defendant. Memorandum in Opposition to Stay. No. 97-322C (Judge Turner)," dated November 17, 1998. 10 pages. (F2001-00630)

203. Letter to Mr. Robert Nordhaus, General Counsel, from Kenneth L. Lay, Chairman and Chief Executive Officer, Enron Corporation, and Ken L. Harrison, Portland General Corporation, Chairman and Chief Executive Officer, dated July 22, 1996. 1 page with nine enclosures. (F2001-00630)
- A. News release "Enron and Portland General Announce Pro-Competitive Merger Transaction Creates Nation's Largest Integrated Natural Gas and Electricity Company." 4 pages. (F2001-00630)
 - B. Document entitled "Enron Corp. And Portland General Corporation Merger Transaction Summary." 1 page. (F2001-00630)
 - C. Undated document entitled "Enron Corporation." 54 pages. (F2001-00630)
 - D. Undated document entitled "Portland General Corporation, Fact Sheet." 1 page. (F2001-00630)
 - E. Undated document entitled "Portland General Corporation and Enron Corporation Community Leadership." 1 page. (F2001-00630)
 - F. Undated document entitled "Edmund P. Segner, III, Executive Vice President & Chief of Staff Enron Corporation," dated April 1996. 1 page. (F2001-00630)
 - G. Undated document entitled "Terrence H. Thorn, Senior Vice President of Public Policy Enron Corp." 1 page. (F2001-00630)
 - H. Undated map entitled "Enron." 1 page. (F2001-00630)
 - I. Undated document entitled "Portland General Corporation." 1 page. (F2001-00630)
204. Letter to Mr. Robert Nordhaus, General Counsel, from Cynthia Sandherr, Director, Federal Government Affairs, dated June 18, 1996. 1 page with one enclosure. (F2001-00630)
- A. Document entitled "Testimony of Kenneth L. Lay, Chairman and CEO, Enron Corporation on Electricity Regulation: A Vision for the Future before the Committee on Commerce Subcommittee on Energy & Power U.S. House of Representatives May 15, 1996." 13 pages. (F2001-00630)
205. Facsimile Transmission Routing Sheet to Robert R. Nordhaus from Terry A. Vaeth and

Rose McKinney James, dated December 11, 1996. 1 page with two enclosures. (F2001-00630)

- A. Memo to AESPD/Jeff Golden from Rose McKinney James, dated November 16, 1996. 7 pages. (F2001-00630)
 - B. Letter to Rose McKinney-James, President & CEO, Corporation for Solar Technology and Renewable Resources and Terry Vaeth, from Robert C. Kelly, Chief Executive Officer, Amoco/Enron Solar Power Development Enron Corporation, dated September 6, 1998. 3 pages. (F2001-00630)
- 206. Document entitled "Talking Points Export Authorizations/Presidential Permits Status/Response to Open Access Issue." 1 page. (F2001-00630)
 - 207. Document titled "Open electricity import/export dockets on 11/26/96. 8 pages. (F2001-00630)
 - 208. Handwritten letter dated, October 18. Information withheld under Exemption 5. 1 page. (F2001-00630)
 - 209. Draft document entitled "[6450-01-P] Department of Energy (FE Docket No. SC-129) Notice of Emergency Application Requesting Action and Order to Show Cause; Enron Power Marketing, Inc. and El Paso Electric Company." Information withheld under Exemption 5. 4 pages. (F2001-00630)
 - 210. Document entitled "United States Department of Energy Office of Fossil Energy Washington, D.C. FE Docket No. SC-129 El Paso Electric Company Order To Show Cause" dated October, 1996. 4 pages. (F2001-00630)
 - 211. Draft document entitled "Lega; Tjepu Brief Overview Outline." 4 pages. (F2001-00630)
 - 212. Undated document entitled "Show Cause Order El Paso Electric Company." 1 page with thirteen enclosures. (F2001-00630)
 - A. Undated document entitled "Federal Power Act Section 202." 4 pages. (F2001-00630)
 - B. Undated document entitled "DOE Organization Act." 2 pages. (F2001-00630)
 - C. Document entitled "12,161 Executive Order 12038." 7 pages. (F2001-00630)
 - D. Federal Register Notice entitled "Part V Department of Energy Economic Regulatory Administration Electric Power System Permits and Reports; Applications; Administrative Procedures and Sanctions," dated October 28, 1980. 5 pages (F2001-00630)

- E. Document entitled "Department of Energy Delegation From the Assistant Secretary For Fossil Energy to the Deputy Assistant Secretary for Fuels Programs," dated March 10, 1989. 4 pages. (F2001-00630)
- F. Document entitled "United States of America [6450-01] Department of Energy Office of Fossil Energy," dated March 10, 1989. 2 pages. (F2001-00630)
- G. Document entitled "Department of Energy Delegation Order No. 0204-127 To The Assistant Secretary for Fossil Energy," dated February 7, 1989. 5 pages. (F2001-00630)
- H. Document entitled "U.S. Department of Energy Office of Fossil Energy [Docket No. EA-48-I] Order Amending Authorization To Export Electric Energy to Mexico and Superseding Prior Authorizations; El Paso Electric Company," dated April 16, 1992. 6 pages. (F2001-00630)
- I. Undated Document entitled "Department of Energy Fossil Energy [Docket Nos. PP-48-3] Amendment to Presidential Permit PP-48 Authorizing the El Paso Electric Company To Construct, Connect, Operate and Maintain Electric Transmission Facilities at the International Border Between the United States and Mexico." 10 pages. (F2001-00630)
- J. Document entitled "Testimony of Acceptance of Presidential Permit PP-48-3 Authorizing El Paso Electric Company To Construct, Connect, Operate and Maintain Electric Transmission Facilities Across the International Border Between the United States and Mexico," dated January 2, 1991. 1 page. (F2001-00630)
- K. Undated document entitled "U.S. Department of Energy Office of Fossil Energy Presidential Permit PP-92 Authorizing El Paso Electric Company To Construct, Connect, Operate, and Maintain The International Border Between The United States and Mexico." 9 pages. (F2001-00630)
- L. Facsimile Cover Sheet to Doug Smith, Department of Energy, from Dan Larcamp, Federal Energy Regulatory Commission Office of the General Counsel, dated November 5, 1996. Information withheld under Exemption 5. 1 page. (F2001-00630)
- M. Document entitled "United States of America Federal Energy Regulatory Commission Enron Power Marketing, Inc. V. El Paso Electric Company Docket No. EL97-8-000, Notice of Supplemental Order Procedures and Denying Motion," dated November 5, 1996. 3 pages. (F2001-00630)



Department of Energy
Washington, DC 20585

March 22, 2002

NOTE FOR: Carl Michael Smith
Assistant Secretary for Fossil Energy

FROM: *for* Susan Beard *Adviser*
Acting Assistant General Counsel for General Law

SUBJECT: Nomination of National Petroleum Council Members

On February 7, 2002 I concurred in the attached January 24, 2002 action memorandum (and attachments) from you to the Secretary on the above-referenced subject. This package was brought back to OGC today for re-concurrence with respect to the following changes that were subsequently made to the original package:

- Deletion of the following proposed new member: S.J. Jansma, Jr.
- Addition of the following proposed new members: Alan L. Boeckmann, Jim Keyes, Dave L. Murfin, Bill Myler, Jr., Stan Pickens, and Christine Torretti

It is my understanding that these were the only changes made to this package. I concur in these changes. If there were other changes made to the package that were not brought to my attention or if I can be of further assistance, please call me at x63413.

Attachment



11



Department of Energy

Washington, DC 20585

January 24, 2002

ES02-000741

MEMORANDUM FOR THE SECRETARY

THROUGH: Under Secretary for Energy, Environment and Science

FROM: Robert S. Kripowicz
Acting Assistant Secretary for Fossil Energy

SUBJECT: ACTION: Nomination of National Petroleum Council Members

ISSUE: The National Petroleum Council is one of two major advisory committees that provide recommendations for Federal fossil energy policy and programs. The Council's charter, which was renewed on November 1, 2001, authorizes about 175 members, each serving up to 2-year terms. Council membership is usually renewed in conjunction with the charter. The criteria for Council eligibility target senior executive ranks of the oil and natural gas industry and related interests. In the attached recommended appointments, certain nominees represent a core group of companies or organizations that are important to ensure representation of the national oil and natural gas industry market. Some of these have been on the Council for many years. Other nominees bring greater diversity and a broader perspective to the Council. These individuals may serve for a fewer number of terms, in order to rotate representation on the Council. All nominees are anticipated to be assets in their advisory roles.

Based on recommendations from the Council, senior Department officials, and/or the Office of Fossil Energy, it is proposed that:

- 133 individuals be reappointed to the Council, and
- 55 individuals be invited to serve as new Council members.

These individuals represent a cross section of the oil and natural gas industry and related interests, including integrated companies, natural gas and energy service companies, producers, marketers and refiners, service, supply and transport companies, the financial community, academia, consumer and environmental groups, States, Native American tribes, and professional societies.



Printed with soy ink on recycled paper

2
GC

A binder containing further information about the nominees, the departing Council members, and the Council, as well as samples of appropriate letters for your signature, is attached. Based on prior experience, some of those invited to serve may decline the opportunity due to business or personal reasons.

SENSITIVITIES:

On August 15, 2001, you sent letters to 12 senior industry executives, including Mr. Ray Hunt, Chair of the National Petroleum Council Nominating Committee, requesting recommendations for the 2002-2003 term. All recommendations received in response to this letter were considered during the process of determining the final slate of prospective Council nominees. Due to late arriving information, this process was only recently completed. Among the proposed reappointments supported by the Nominating Committee are Victor A. Burk, an analyst with Arthur Andersen, and A. R. (Tony) Sanchez, Jr., Chairman of the Board and Chief Executive Officer, Sanchez-O'Brien Oil and Gas Corporation, who announced in December 2001 his intent to run for Governor of Texas. Such an endeavor would generally not preclude Mr. Sanchez from being a Council member.

Thirty-six individuals are departing as Council members due to mergers/acquisitions, retirements or other circumstances and would usually receive a letter thanking them for their service. Among these individuals is Kenneth Lay, Chairman and Chief Executive Officer, Enron Corporation. One member died in late 2001, and his next of kin should receive a letter of condolence.

Further, it may be appropriate for you to personalize letters to some nominees with whom you are acquainted.

Depending on your availability, the Council tentatively plans to meet in Washington, D.C. on April 10, 2002. It is well advised to resolve issues related to membership renewal in advance of the event, such that returning and new Council members may attend.

POLICY IMPACT:

It is anticipated that nominees for the 2002-2003 will have the capability to provide balanced and credible advice to you in your capacity as the Secretary of Energy. Such advice is usually provided through the conduct of studies requested of the Council by the Secretary. Separate action memoranda for your review are being prepared on the commissioning of new studies. Prospective

study topics currently include: North American natural gas supply, industry fuel switching capabilities, oil and gas industry vulnerability/critical infrastructure protection, and the changing characteristics of the oil and gas industry in the 21st century.

RECOMMENDATION: That you authorize letters under your signature to be sent to the prospective and departing Council members. These actions are generally endorsed by Marshall Nichols, the Executive Director of the Council.

Attachments

APPROVE: _____

DISAPPROVE: _____

DATE: _____

CONCURRENCES: General Counsel _____

Susan F. Beard 2/7/02
Verifying for the Office of
General Counsel

Management, Budget
& Evaluation/CFO

[Signature]

FEB - 8 2002

Advisory Committee
Management Officer

James A. Dineen 2/7/02

NATIONAL PETROLEUM COUNCIL MEMBERSHIP: 2002-2003 Term
Sensitivities

- 1) **A.R. (Tony) Sanchez, Jr., Chairman of the Board and Chief Executive Officer, Sanchez-O'Brien Oil and Gas Corporation.** Announced his intent in December 2001 to run as a Democratic candidate for Governor of Texas. Party primaries will be held March 12, 2002. Such circumstance would not usually preclude a member from being reappointed to the Council. His reappointment is endorsed by the NPC Nominating Committee.
Recommended Action: Reappoint.
- 2) **Kenneth Lay, Chairman and Chief Executive Officer, Enron Corporation.** Pending Congressional, SEC and other investigations.
Recommended Action: Reappointment not recommended, at this time. This decision is supported by the NPC Nominating Committee. Ask that the Council delete his name from the membership roles for the 2002-2003 term. DOE should not send him a "thank you for your service letter."
- 3) **Victor A. Burk, Managing Partner, Global Energy and Utilities, Arthur Andersen, LLP.** Issues related to Enron may have ramifications for Arthur Andersen and its employees.
Recommended Action: Reappoint. Mr. Burk is a prominent industry analyst, not an auditor. His reappointment is endorsed by the NPC Nominating Committee.
- 4) **Emil Pena, President and Chief Executive Officer, Generation Power, Inc.** Appointed to the Council in late January 2001 by Secretary Richardson. Former DOE Deputy Assistant Secretary for Natural Gas and Petroleum Technology (Jan 2000 - 2001). Mr. Pena is prominent in the Southwest U.S. Hispanic business community and is knowledgeable of oil and gas industry dynamics and cross-border trade issues with Mexico. His prior government service (as a Schedule C appointee in the Clinton Administration) may prevent him from being a full and robust participant in some Council matters due to conflict of interest/ethics restrictions, specifically matters related to offshore oil and gas technology issues which he championed during his tenure at DOE.
Recommended Action: Reappoint. Avoiding conflicts of interest is primarily the responsibility of individual Council members. At present, GC staff perceive that nothing precludes Mr. Pena from being reappointed a Council member (and may counsel Mr. Pena's attorney in that regard). Mr. Pena's reappointment to the Council is supported by Senator Kay Bailey Hutchison (letter of January 18, 2002).
- 5) **Gonzalo Barrientos, State Senator, and Rene O. Oliveira, State Representative, Texas State Legislature.** Prior appointments resulted in two state legislators from the same state serving on the Council during the 2000-2001 term. Both have extensive oil and gas expertise. Having two Council members from the same state appeared a duplication and a potential imbalance.
Recommended Action: Reappoint. Address the issue of imbalance by inviting the Chair of the Energy Council, currently Jon Fitch (Arizona), to be a new member of the NPC.

A

The Energy Council is an organization representing the interests of state legislators from 10 states who have responsibilities related to electric utility, oil and gas and other energy issues. State representation on the Council will be further enhanced and diversified by inviting Vicki Cowart, President, American Association of State Geologists, and W. Robert Keating, Commissioner, MA Department of Telecommunications and Energy and current Chair of the National Association of Regulatory Utility Commissioners Natural Gas Committee, to be new members (as recommended).

- 6) **Donald C. Evans, Secretary of Commerce (formerly Chairman of the Board and Chief Executive Officer, Tom Brown, Inc.).** Both Richard Cheney and Donald Evans served on the NPC prior to accepting positions in the current Administration. Mr. Cheney's predecessor at Haliburton, David Lesar, Chairman of the Board, President and Chief Executive Officer, was appointed to the Council during the 2000-2001 term. No action was previously taken to appoint another executive from Tom Brown, Inc. **Recommended Action:** Invite James D. Lightner, President and Chief Executive Officer, Tom Brown, Inc., to become a new member of the Council. His appointment is endorsed by the NPC Nominating Committee. Reappoint David Lesar to the Council. As previously recommended in May 2001, DOE should not send a "thank you for your service letter" to Donald Evans.

- 7) **Representation by Minorities and Women on the Council.** Based on current recommendations, representation on the Council by minorities (specifically African Americans, Hispanics and Native Americans) will decline from 15% to 10% of the total membership between the 2000-2001 term and the 2002-2003 term. Representation by women stays constant in terms of percentage (6%) although the actual number of women members on the Council will increase by 2 persons. **Recommended Action:** Support the proposed reappointments and new member recommendations outlined in attachments to the action memorandum which recognize the personal accomplishments and corporate affiliation of individuals, for the most part regardless of their racial or ethnic origin. This will result in 16% of the total membership being minorities or women. These statistics are conservative and do not include: 1) nominees who are of Native American descent but do not represent the interests of a particular Tribe, 2) nominees who are Arab Americans or of other diverse origin, 3) executives whose companies (e.g., Sempra) are widely recognized for their diversity policies and initiatives.

- 8) **Individuals Presumably Known Personally to the Secretary.**

Richard Abdoo, Chairman and Chief Executive Officer, Wisconsin Energy. See Tab 7 in the binder on Others Considered and Not Recommended for Appointment. Mr. Abdoo originally recommended Gerald A. Abood, Assistant Vice President, Commodity Resources, Wisconsin Energy, for membership on the Council. The Nominating Committee judged Mr. Abdoo himself to be a more appropriate candidate and contacted him in that regard. Mr. Abdoo reportedly agreed he was the appropriate candidate, withdrew his recommendation of Mr. Abood, and then explained he himself was unavailable to serve on the Council at this time.

Recommended Action: Seek other candidates of appropriate stature, in consultation with Secretary.

John Kaneb, Chief Executive Officer, Gulf Oil Limited Partnership. John Kaneb originally recommended Gary Kaneb, President, Gulf Oil Limited Partnership, to serve on the Council. John Kaneb was deemed to be a more appropriate candidate; he was contacted by the NPC Nominating Committee and has agreed to serve if invited.

Recommended Action: Personalized invitation letter.

Sam Simon, Chief Executive Officer and President, Atlas Oil Company, Michigan. Included in the list of proposed new members. His appointment is endorsed by the NPC Nominating Committee. Mr. Simon has conveyed to the Executive Director of the NPC that he is interested and willing to serve.

Recommended Action: Personalized invitation letter.

J. Robinson West, Chairman, The Petroleum Finance Company. Included in the list of proposed new members. Identified as a candidate by Andrew Lundquist. His appointment is endorsed by the NPC Nominating Committee. And, Mr. West remains interested and willing to serve.

Recommended Action: Proceed with appointment as new member.

- 9) **Letters Requesting Recommendations.** In August 2001, Secretary Abraham sent letters to the following individuals requesting recommendations on appointments to the Council:
- William T. McCormick, Jr., Chairman and Chief Executive Officer, CMS Energy
 - Anthony Early, Jr., Chairman and Chief Executive Officer, DTE
 - C. John Miller, Chief Executive Officer, Miller Energy, Inc.
 - Jim Nicholson, PVS Chemicals,
 - Ray Irani, Chairman and Chief Executive Officer, Occidental Petroleum Company
 - Richard Abdoo, Chairman and Chief Executive Officer, Wisconsin Energy
 - John Kaneb, Chief Executive Officer, Gulf Oil
 - Lodwick Cook, Chairman, Global Crossing
 - Ken Lay, Chairman and Chief Executive Officer, Enron Corporation
 - Donald Evans, Secretary of Commerce
 - Tom Cole, U.S. Chamber of Commerce
 - Ray L. Hunt, Chairman, Hunt Oil Company (Chairman NPC Nominating Committee)

Of this list, John Miller and Ray Hunt are already members of the Council, William T. McCormick, Jr., and Ray Irani are former members recommended by the NPC Nominating Committee to be reappointed, and Anthony Early, Jr., and John Kaneb are recommended by the NPC Nominating Committee as new members. Except as noted in 8) above, all recommendations proposed by the recipients of the August 2001 letters were accepted by the NPC Nominating Committee and are included in the listings of proposed appointments and proposed new members (Tabs 2 and 3).

- 10) **April 10, 2002 Meeting.** There is a full Council meeting planned for April 10, 2002, where it would be customary for the Secretary to recognize the new members, individually or collectively as he wishes.
- 11) **John T. Palmer, Chairman, Palmer Petroleum, Inc.** Mr. Palmer made it known to the Council on January 18, 2002, that he appreciates being considered but cannot at this time serve on the Council. His appointment was endorsed by the NPC Nominating Committee. **Recommended Action:** Delete Mr. Palmer's name as a candidate. The resulting total of recommended appointments to the Council becomes 187.

N.Johnson, FE, 1-23-02.

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C.

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation												
	Integrated Oil and Gas Companies	Nat'l Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
	11	15	9	44	13	10	12	4	4	7	4	19	8
Jacob Adams President Arctic Slope Regional Corporation Barrow, AK	✓									✓		✓	
George A. Alcorn President Alcorn Exploration, Inc. Houston, TX	✓			✓									
Conrad K. Allen Vice President Nat'l Assoc. of Black Geologists and Geophysicists Houston, TX						✓					✓		
Robert J. Allison, Jr. Chairman and Chief Executive Officer Anadarko Petroleum Corporation Houston, TX	✓			✓									
Robert O. Anderson Roswell, NM	✓							✓					
Philip F. Anschutz President Anschutz Corporation Denver, CO	✓			✓									
Gregory L. Armstrong Chairman and Chief Executive Officer Plains All American Houston, TX					✓								
Robert G. Armstrong President Armstrong Energy Corporation Roswell, NM	✓			✓									
Ralph E. Bailey Chairman and Chief Executive Officer Xpronet Inc. Stamford, CT	✓			✓									

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

D

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
D. Euan Baird Chairman, President and Chief Executive Officer Schlumberger Limited New York, NY	✓					✓								
Gonzalo Barrientos State Senator Texas State Senate Austin, TX											✓		✓	
Riley P. Bechtel Chairman and Chief Executive Officer Bechtel Group, Inc. San Francisco, CA	✓						✓							
M. Frank Bishop Executive Director National Association of State Energy Officials Alexandria, VA	✓										✓			
Carl E. Bolch, Jr. Chairman and Chief Executive Officer Racetrac Petroleum, Inc. Atlanta, GA	✓		✓											
John F. Bookout Houston, TX	✓						✓							
Victor A. Burk Managing Partner Global Energy & Utilities, Arthur Andersen, L.L.P. Houston, TX	✓							✓						
Frank M. Burke, Jr. Chairman and Chief Executive Officer Burke, Mayborn Company, Ltd. Dallas, TX	✓							✓						
Karl R. Buder President and Chief Executive Officer ICC Energy Corporation Dallas, TX			✓									✓		

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Phillip J. Carroll Chairman and Chief Executive Officer Fluor Corporation Aliso Viejo, CA	✓					✓								
R.D. Cash Chairman and Chief Executive Officer Questar Corporation Salt Lake City, UT	✓		✓											
Robert B. Catell Chairman and Chief Executive Officer Keyspan Brooklyn, NY	✓		✓											
Clarence P. Cazalot, Jr. President Marathon Oil Company Houston, TX	✓	✓												
Paul W. Chellgren Chairman and Chief Executive Officer Ashland Inc. Covington, KY	✓					✓								
Luke R. Corbett Chairman and Chief Executive Officer Kerr-McGee Corporation Oklahoma City, OK	✓				✓									
Michael B. Coulson President Coulson Oil Company North Little Rock, AR				✓										
Gregory L. Craig President Cook Inlet Energy Supply Los Angeles, CA			✓										✓	
William A. Custard President and Chief Executive Officer Dallas Production, Inc. Dallas, TX	✓			✓										

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat'l Gas & Energy Service Companies	Ind'l Markets and Refiners	Ind'l Oil and Gas Producers	Drilling Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Robert Darbelnet President and Chief Executive Officer AAA Heathrow, FL	✓											✓		
Claiborne P. Deming President and Chief Executive Officer Murphy Oil Corporation El Dorado, AK	✓	✓												
Cortlandt S. Dietler President and Chief Executive Officer TransMontaigne Oil Company Denver, CO	✓				✓									
David F. Dorn Chairman Emeritus Forest Oil Corporation Denver, CO	✓				✓									
John G. Drosdick Chairman, President and Chief Executive Officer Sunoco, Inc. Philadelphia, PA	✓		✓											
Archie W. Dunham Chairman, President and Chief Executive Officer Conoco, Inc. Houston, TX	✓	✓												
W. Byron Dunn President and Chief Executive Officer Lone Star Steel Company Dallas, TX	✓				✓									
Daniel C. Eckermann President and Chief Executive Officer LeTourneau, Inc. Longview, TX	✓				✓									
James W. Emison Chairman and Chief Executive Officer Western Petroleum Company Eden Prairie, MN	✓		✓											

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Distrib. Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Ronald A. Erickson Chief Executive Officer Holiday Companies Minneapolis, MN	✓			✓										
Sheldon R. Erickson Chairman, President and Chief Executive Officer Cooper Cameron Corporation Houston, TX	✓				✓									
John G. Farbes President Big Lake Corporation Dallas, TX				✓								✓		
Thomas L. Fisher Chairman, President and Chief Executive Officer Nicor Inc. Naperville, IL	✓		✓											
William L. Fisher Chair in Mineral Resources University of Texas at Austin Austin, TX	✓								✓					
James C. Flores Chairman, President and Chief Executive Officer Plains Resources Houston, TX	✓			✓										
Joe B. Foster Non-Executive Chairman Newfield Exploration Company Houston, TX	✓			✓										
Robert W. Fri Visiting Scholar Resources for the Future Washington, DC	✓										✓			
Murry S. Gerber President and Chief Executive Officer Equitable Resources Pittsburgh, PA	✓	✓												

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
James A. Gibbs President Five States Energy Company Dallas, TX	✓				✓									
Rufus D. Gladney Chairman American Association of Blacks in Energy Jackson, MI							✓						✓	
Bruce C. Gottwald Chairman Ethyl Corporation Richmond, VA	✓					✓								
S. Diane Graham Chairman and Chief Executive Officer • STRATCO, Inc. Scottsdale, AR	✓					✓								✓
Frederic C. Hamilton Chairman and Managing Partner Hamilton Companies Denver, CO	✓			✓										
Christine Hansen Executive Director Interstate Oil and Gas Compact Commission Oklahoma City, OK	✓									✓				✓
Angela E. Harrison Chairman and Chief Executive Officer WELSCO, Inc. North Little Rock, AR						✓								✓
John B. Hess Chairman and Chief Executive Officer Amerada Hess Corporation New York, NY	✓	✓												
Jack D. Hightower Chairman, President and Chief Executive Officer Pure Resources, Inc. Midland, TX	✓			✓										

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation												
	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Jerry V. Hoffman Chairman, President and Chief Executive Officer Berry Petroleum Company Taft, CA	✓			✓									
Roy M. Huffington Chairman and Chief Executive Officer Roy M. Huffington, Inc. Houston, TX	✓			✓									
Ray L. Hunt Chairman Hunt Oil Company Dallas, TX	✓	✓											
Frank J. Iarossi Chairman and Chief Executive Officer • American Bureau of Shipping & Affiliated Companies Houston, TX	✓				✓								
Eugene M. Isenberg Chairman and Chief Executive Officer Nabors Industries, Inc. Houston, TX	✓			✓									
Jon Rex Jones Chairman EnerVest Management Company, L.C. Albany, TX	✓			✓									
A. V. Jones, Jr. Chairman Van Operating, Ltd. Albany, TX	✓			✓									
Jerry D. Jordan President Jordan Energy Inc. Columbus, OH	✓					✓							
Fred C. Julander President Julander Energy Company Denver, CO	✓			✓									

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Markets and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Bernard J. Kennedy Chairman and Chief Executive Officer National Fuel Gas Company Buffalo, NY	✓	✓												
Richard D. Kinder Chairman and Chief Executive Officer Kinder Morgan Energy Partners, L.P. Houston, TX	✓					✓								
Fred Krupp Executive Director Environmental Defense Fund New York, NY	✓											✓		
Susan M. Landon Petroleum Geologist Independent Petroleum Geologist Denver, CO							✓							✓
Stephen D. Layton President E&B Resources The Woodlands, TX	✓			✓										
Virginia B. Lazenby Chairman and Chief Executive Officer Bretnage G.P. Nashville, TN	✓			✓										✓
David J. Lesar Chairman, President and Chief Executive Officer Halliburton Company Dallas, TX	✓				✓									
Daniel H. Lopez President New Mexico Institute of Mining and Technology Socorro, NM									✓			✓		
Thomas E. Love Chairman and Chief Executive Officer Love's Country Stores, Inc. Oklahoma City, OK	✓		✓											

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
S. Todd Maclin Group Executive J.P. Morgan Securities, Inc. Dallas, TX	✓								✓					
Cary M. Maguire President Maguire Oil Company Dallas, TX	✓				✓									
Robert A. Malone Regional President for the Western U.S. BP P.L.C. Los Angeles, CA	✓	✓												
Timothy M. Marquez President and Chief Executive Officer Venoco, Inc. Carpinteria, CA	✓				✓								✓	
Frederick R. Mayer Chairman Captiva Resources, Inc. Denver, CO	✓				✓									
William D. McCabe Vice President, Energy Resources ThermoEnergy Corporation Denver, CO	✓		✓										✓	
F.H. Merelli Chairman and Chief Executive Officer Key Production Company, Inc. Denver, CO	✓				✓									
C. John Miller Chief Executive Officer Miller Energy, Inc. Kalamazoo, MI	✓				✓									
Steven L. Miller Chairman, President and Chief Executive Officer Shell Oil Company Houston, TX	✓	✓												

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Herman Morris, Jr. President and Chief Executive Officer Memphis Light, Gas and Water Memphis, TN			✓										✓	
Robert A. Mosbacher Chairman Mosbacher Energy Company Houston, TX	✓				✓									
James J. Mulva Chairman and Chief Executive Officer Phillips Petroleum Company Bartlesville, OK	✓	✓												
John Thomas Munro President Munro Petroleum & Terminal Corporation Biloxi, MS	✓			✓										
Mark B. Murphy President Strata Production Company Roswell, NM	✓			✓										
Gary L. Neale Chairman, President and Chief Executive Officer NiSource Inc. Merrillville, IN	✓		✓											
J. Larry Nichols Chairman, President and Chief Executive Officer Devon Energy Corporation Oklahoma City, OK	✓			✓										
Rene O. Oliveira State Representative House of Representatives of the State of Texas Austin, TX										✓		✓		
David J. O'Reilly Chairman and Chief Executive Officer Chevron Texaco Corporation San Francisco, CA	✓	✓												

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
C.R. Palmer Chairman, President and Chief Executive Officer Rowan Companies, Inc. Houston, TX	✓					✓								
Mark G. Papa Chairman and Chief Executive Officer EOG Resources, Inc. Houston, TX	✓				✓									
Paul H. Parker Vice President Center for Resource Management Salt Lake City, UT											✓			
Robert L. Parker, Sr. Chairman Parker Drilling Company Tulsa, OK	✓					✓								
Emil Peña President and Chief Executive Officer Generation Power Inc. Houston, TX							✓					✓		
L. Frank Pitts Owner Pitts Energy Group Dallas, TX	✓				✓									
Richard B. Priory Chairman, President and Chief Executive Officer Duke Energy Corporation Charlotte, NC	✓	✓												
Caroline Quinn President Farrar Oil Company Mount Vernon, IL	✓				✓									✓
Lee R. Raymond Chairman, President and Chief Executive Officer Exxon Mobil Corporation Irving, TX	✓	✓												

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
John G. Rice President and Chief Executive Officer GE Power Systems Schenectady, NY	✓						✓							
Corbin J. Robertson, Jr. President Quintana Minerals Corporation Houston, TX	✓				✓									
Robert Rose Chairman, President and Chief Executive Officer Global Marine Inc. Houston, TX	✓					✓								
Henry A. Rosenberg, Jr. Chairman Crown Central Petroleum Corporation Baltimore, MD	✓			✓										
A.R. Sanchez, Jr. Chairman and Chief Executive Officer Sanchez-O'Brien Oil and Gas Corporation Laredo, TX	✓				✓							✓		
Robert Sanústevan Director Southern Ute Indian Tribe Growth Fund Durango, CO	✓										✓		✓	
S. Scott Sevell President Delta Energy Management, Inc. New Orleans, LA							✓							
Bobby S. Shackouls Chairman, President and Chief Executive Officer Burlington Resources Inc. Houston, TX	✓				✓									
Matthew R. Simmons President Simmons and Company International Houston, TX	✓							✓						

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Bruce A. Smith Chairman, President and Chief Executive Officer Tesoro Petroleum Corporation San Antonio, TX	✓	✓												
Arthur L. Smith Chairman John S. Herold, Inc. Houston, TX	✓						✓							
Joel V. Staff Chairman and Chief Executive Officer National-Oilwell, Inc. Houston, TX	✓					✓								
Charles C. Stephenson, Jr. Chairman Vintage Petroleum, Inc. Tulsa, OK	✓			✓										
James H. Stone Chairman Stone Energy Corporation New Orleans, LA	✓			✓										
Caroll W. Suggs Metairie, LA							✓							✓
Patrick F. Taylor Chairman and Chief Executive Officer Taylor Energy Company New Orleans, LA	✓			✓										
Richard E. Terry Chairman and Chief Executive Officer Peoples Energy Corporation Chicago, IL	✓	✓												
Gerald Torres Associate Dean and Vice Provost University of Texas School of Law at Austin Austin, TX									✓			✓		

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
H. A. True, III Partner True Oil Company Casper, WY	✓				✓									
Thurman Velarde Administrator Oil and Gas Administration, Jicarilla Apache Tribe Dulce, NM	✓										✓		✓	
Randy E. Velarde President Plaza Group Houston, TX				✓									✓	
Philip K. Verleger, Jr. President PK Verleger, L.L.C. Newport Beach, CA	✓						✓							
Joseph C. Walter, III President Walter Oil & Gas Corporation Houston, TX					✓							✓		
L. O. Ward Owner - President Ward Petroleum Corporation Enid, OK	✓			✓	✓									
C. L. (Chuck) Watson Chairman and Chief Executive Officer Dynergy Inc. Houston, TX	✓		✓											
Michael E. Wiley Chairman, President and Chief Executive Officer Baker Hughes Incorporated Houston, TX	✓				✓									
Bruce W. Wilkinson Chairman and Chief Executive Officer McDermott International, Inc. New Orleans, LA	✓				✓									

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

National Petroleum Council Membership: 2002-2003 Term

PROPOSED REAPPOINTMENTS (133)	NPC Core Recommendation	Integrated Oil and Gas Companies	Nat. Gas & Energy Service Companies	Ind. Marketers and Refiners	Ind. Oil and Gas Producers	Drilling, Service and Supply	Chem., Transp. & Other Companies	Other Industry-Related*	Financial	Academia	States and Tribes	Other Non-Industry**	Minority	Woman
Mary Jane Wilson President and Chief Executive Officer WZI Inc. Bakersfield, CA	✓							✓						✓
Brion G. Wise Chairman and Chief Executive Officer Western Gas Resources, Inc. Denver, CO	✓		✓											
William A. Wise Chairman, President and Chief Executive Officer El Paso Corporation Houston, TX	✓		✓											
George M. Yates President and Chief Executive Officer * Harvey E. Yates Company Roswell, NM	✓				✓									
John A. Yates President Yates Petroleum Company Artesia, NM	✓				✓									
Daniel H. Yergin President Cambridge Energy Research Associates Cambridge, MA	✓							✓						
Henry Zarrow Vice Chairman Sooner Pipe & Supply Corporation Tulsa, OK	✓				✓									

*Includes Research Organizations, Consultants and Others

**Includes Environmental Organizations and Others

E.

**NATIONAL PETROLEUM COUNCIL
RECOMMENDATIONS FOR NEW APPOINTMENTS – 2002-2003 TERM**

[Note: The following individuals (55) have been recommended by the National Petroleum Council (NPC) Nominating Committee or members, senior Department of Energy officials and/or the Office of Fossil Energy for appointment for the 2002-2003 term.]

Paul M. Anderson

Managing Director and Chief Executive Officer
BHP Billiton
Melbourne, Australia

- Recommended by NPC as a replacement for Howard Paver, Managing Director, International, Amerada Hess International, LTD., also former President and General Manager of BHP Petroleum Americas.
- Former President and Chief Operating Officer of Duke Energy Corporation; President, Chairman and CEO of PanEnergy Corporation; and a prior Director of KerrMcGee Corporation, Baker Hughes Inc., and TEPPCO Partners, LP. Advisory Director of Temple-Inland, Inc. and Stanford University Graduate School of Business.
- BHP is 9th largest lease holder in U.S. Gulf of Mexico water depths greater than 1,500 feet. Corporate business lines include oil and gas exploration, production, and liquified natural gas (LNG), carbon and stainless steel materials, coal, steel, and non-energy minerals (e.g. nickel, iron ore, aluminum, copper, diamonds and silver).

Gregory A. Arnold

President and Chief Operating Officer
Truman Arnold Companies
Texarkana, Texas

- Recommended by NPC as a replacement for resigning member O. Truman Arnold, former Chairman and CEO of Truman Arnold Companies.
- Responsible for financial operation of downstream petroleum marketing and distribution services, including gasoline and convenience stores; has expertise in fuel needs of southwestern U.S.; currently working on Truman Arnold Companies' planned expansion into petroleum, aviation, and financial services.

Stephen L. Baum

Chairman, President and Chief Executive Officer
Sempra Energy
San Diego, California

- Diversity candidate through diversity activism in the energy industry.
- Both a Fortune 500 company and a Fortune Top 5 Best Companies for Minorities.
- Baum directs the strategic operations of all Sempra Energy Companies, with utility subsidiaries serving over 21 million consumers, the largest customer base of any energy utility in the U.S. Also, is actively involved in leading the company's international operations.
- Member of the Board of Directors of Computer Sciences Corporation (which assists clients in industry and government use information technology to achieve strategic and operational objectives) and the Ceil H. and Ida M. Green Foundation of Earth Sciences, University of California at San Diego.
- Baum's predecessor, Dick Farrman, was a long time, active member of the Council.

F

Donald T. "Boysie" Bollinger
 Chairman and Chief Executive Officer
 Bollinger Shipyards, Inc.
 Lockport, Louisiana

- Full service marine construction and repair operation with marketing efforts worldwide.
- Other endeavors includes serving on Boards of Directors of Tidewater Inc., Bank One LA, NA, the Louisiana Workers Compensation Corporation, and the New Orleans Dock Board, and on the Board of Commissioners for the Port of New Orleans.
- Current Chairman of the Offshore Marine Services Association. Past Chairman of the Shipbuilders Council of America. Former Chairman and current member of the Board of Directors of the National Ocean Industries Association

Wayne H. Brunetti
 Chairman, President and Chief Executive Officer
 XCEL Energy Inc.
 Minneapolis, Minnesota

- Nation's fourth largest utility company serving both electricity and natural gas customers in twelve Western and Midwestern states. The company earned Electric Light and Power Magazine's Utility of the Year Award (Jan. 2001).
- Has served on numerous Electric Power Research Institute (EPRI) and Edison Electric Institute (EEI) committees; currently on EEI's executive committee, policy committee on energy services and policy committee on energy supply.
- Serves on the Board of Directors of Western Energy Supply and Transmission (WEST) Associates, and Mountain States Partnerships.
- Appointed by Gov. Roy Romer to serve on the Colorado Renewable Energy Task Force.

Phillip J. Burguières
 Chairman and Chief Executive Officer
 EMC Holdings, LLC
 Houston, Texas

- Investment management company specializing in oil services and exploration and production industries.
- Currently serves on the Boards of Directors of Weatherford International, Inc. (a diversified international energy services and manufacturing company), Chase Bank of Texas, and Newfield Exploration Company.
- Former NPC member as CEO, Cameron Iron Works, and later as CEO, Panhandle Eastern Corp. (a natural gas transmission company).

Thomas E. Capps
 Chairman, President and Chief Executive Officer
 Dominion Resources, Inc.
 Richmond, Virginia

- Recommended replacement from NPC for both George Davidson, Retired Chairman, Dominion Resources and Mark E. Monroe former Chairman and Chief Executive Officer of Louis Dreyfus Natural Gas before the merger with Dominion.

- Previously recommended by George A. Davidson (retired Chairman August 1, 2000).
- Dominion's acquisition of Louis Dreyfus Natural Gas increases its natural gas reserves by 60% and is expected over the next three years to help double its electric and gas trading sector.
- Operates the Nation's largest underground natural gas storage system, with more than 950 billion cubic feet of storage space.
- Former Executive Vice President of Virginia Power, a Dominion subsidiary.

Vicki J. Cowart

President

Association of American State Geologists (AASG)

Denver, Colorado

- AASG is an organization of the chief executives of the state geological surveys in 50 states and Puerto Rico. It is a basic information source for their state governments' executive, legislative, and judicial branches.
- Cowart is the Director of the Colorado Geological Survey and a member of the National Academy of Science Committee on Earth Resources.
- Received the alumni Distinguished Achievement Medal from the Colorado School of Mines. Founded the Denver Chapter of the Association for Women Geoscientists. Active in the Society of Exploration Geophysicists.

Charles D. Davidson

Chairman, President and Chief Executive Officer

Noble Affiliates, Inc.

Houston, Texas

- Recommended by NPC as a replacement for Robert Kelley, Retired Chairman of the Board.
- Noble Affiliates, Inc. is a major U.S. independent oil and natural gas exploration and development company that is heavily focused on natural gas; principal operations are in Colorado, Montana, Kansas, Oklahoma, Louisiana, and Texas. Offshore activities are principally conducted in the Gulf of Mexico. International production is in Equatorial Guinea, the North Sea and Argentina.
- Davidson was formerly CEO of Vastar Resources, Inc. until its merger with British Petroleum.

E. Linn Draper, Jr.

Chairman, President and Chief Executive Officer

American Electric Power, Inc.

Columbus, Ohio

- Recommended by NPC Nominating Committee.
- American Electric Power services several U.S. states in the Midwest and has a presence in Australia, Brazil, China, Mexico and the United Kingdom.
- Draper is also President of Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation.
- Member of the National Academy of Engineering since 1992.
- Member of the Board of Directors of the Nuclear Energy Institute (past Chairman), the Institute of Nuclear Power Operations (past Chairman), the National Coal Council (past Chairman) and the Edison Electric Institute (past Chairman).

Anthony F. Early, Jr.

Chairman and Chief Executive Officer

DTE

Detroit, Michigan

- NPC member Alfred R. Glancy III retired without a recommendation for replacement: MCN, Glancy's former company that was merged into DTE, leaving Early as NPC's recommended replacement for Glancy on the Council.
- Corporate holdings include DTE Energy, with its principal subsidiary, Detroit Edison, being the Nation's seventh largest electric utility, and MichCon, the Nation's tenth largest natural gas local distribution company.
- Early is the former President and Chief Operating Officer, Detroit Edison (before merger into DTE). Former President and Chief Operating Officer of the Long Island Lighting Company, an electric and gas utility in New York. Member of the Advisory Council for the College of Engineering at the University of Notre Dame.

Claire Scobee Farley

Chief Executive Officer

Trade-Ranger

Houston, Texas

- Recommended by NPC Nominating Committee.
- Internet-based marketplace dedicated to buying and selling materials and services used by the energy industry.
- Former CEO Intelligent Diagnostics, an Internet-based company. Former President of Texaco Worldwide Exploration and New Ventures. In 1998, Farley was a Texaco corporate officer and president of North American production; the same year she was named one of America's top 50 women executives by Fortune Magazine.

Jon Fitch

Chairman

Energy Council

Dallas, Texas

- Current Chairman of the Energy Council which provides a forum for addressing government policies regarding energy and the environment represents the interests of state legislators in 10 member states.
- Member of the Arkansas State Senate since 1985; House from 1979-83. Numerous committee positions including ALC-Review (Chair), Insurance and Commerce - Senate (Chair), Joint Budget (member), Joint Auditing, and Joint Energy (member).

H. Allen Franklin

Chairman, President and Chief Executive Officer

Southern Company

Atlanta, Georgia

- Recommended by NPC Nominating Committee.
- A super-regional energy company in the Southeast and a major U.S. producer of electricity serving nearly 4 million customers.
- Chairman of Edison Electric Institute's CEO Steering Committee on Industry Structure. Chairman of Metro Atlanta Chamber of Commerce and Director on boards of several regional organizations including Atlanta Area Council of Boy Scouts of America.
- Elected a Senior Member of the Institute of Electrical and Electronics Engineers.
- Active on the national level, providing leadership on issues affecting the structure of the electric utility industry and testifying before Congressional committees on behalf of industry.

Lawrence J. Goldstein

President

Petroleum Industry Research Foundation

New York, New York

- Recommended replacement for John H. Lichblau former Chairman, and Chief Executive Officer of Petroleum Industry Research Foundation (retired 12-31-01).
- President and a member of the Board of the Petroleum Industry Research Foundation Inc., an internationally known non-profit think tank.
- Prominent expert in the energy industry whose work covers a broad spectrum of energy market analysis from short term oil pricing to mergers and acquisitions to strategic business and legislative planning. Testified before Congressional committees and counseled numerous trade and government groups on legislative and regulatory issues.
- Past contributor to NPC studies on Storage, Refining, and Emergency Preparedness.
- Member of PIRINC's Board of Trustees and is a Trustee of the Scientists' Institute for Public Information.
- Past Member of the Petroleum Advisory Committee of the New York Mercantile Exchange.

William E. Greehey

Chairman and Chief Executive Officer

Valero Energy Corporation

San Antonio, Texas

- Recommended replacement for Jean Gaulin, former Chairman, President and CEO of Ultramar Diamond Shamrock which was acquired by Valero (12-31-01).
- Valero owns and operates six refineries in Texas, Louisiana, California, and New Jersey with a combined throughput capacity of over one million barrels per day.
- Acquired Ultramar Diamond Shamrock which made it the second largest refining company in the U.S.
- Possesses a network of retail stores in California with 80 company-owned stores and a 270 store distribution chain.
- Selected by Fortune Magazine as one of the "100 Best Companies to Work for in America".
- Greehey was formerly the Senior Vice President of Finance at Exxon.

Robbie Rice Gries

President

American Association of Petroleum Geologists (AAPG)

Tulsa, Oklahoma

- AAPG is world's largest professional geological society with over 30,000 members.
- Nearly 100 local, national, and regional geoscience associations around the world are affiliated with AAPG and are represented in AAPG's House of Delegates.
- Gries is also President and Chief Executive Officer of Priority Oil & Gas LLC, Denver.
- Authored numerous papers on Rocky Mountain geology and edited the Rocky Mountain seismic volume.
- Member of the Geological Society of America and the Society for Sedimentary Geology.

James T. Hackett

Chairman, President and Chief Executive Officer

Ocean Energy, Inc.

Houston, Texas

- Recommended by NPC Nominating Committee.
- North American operations are focused in the shelf and deepwater areas of the Gulf of Mexico, the Rocky Mountains, Permian Basin, East Texas and Gulf Coast Regions. Ocean Energy holds

a leading position among U.S. independents in West Africa and also conducts operations in Egypt, Tatarstan, Brazil, Pakistan and Indonesia.

- Previously merged with Seagull Energy keeping the Ocean Energy name.
- Hackett is the Director of New Jersey Resources, Kaiser Aluminum Corporation Temple-Inland, Inc. and Flour Corporation. Member of the Policy Committee of the American Petroleum Institute, the Executive Committee Member of the Domestic Petroleum Council, and the Society of Petroleum Engineers.
- Previous Energy experience includes Duke Energy, Pan Energy, Dynegy, Burlington Resources and Amoco Oil Company.

Lewis Hay III

Chairman, President and Chief Executive Officer

FPL Group Inc.

Juno Beach, Florida

- Provider of electricity-related services.
- Subsidiaries include: Florida Power & Light Company, FPL Energy and FPL FiberNet.
- Florida Power & Light serves more than 7 million people along the eastern seaboard and southern and southwestern portions of Florida.
- Hay is a member of the Board of Directors of Utilities, Inc., a Chicago-based water utility holding company.

Frank O. Heintz

President and Chief Executive Officer

Baltimore Gas and Electric Company (BGE)

Baltimore, Maryland

- BGE has provided gas and electric services in Maryland for over 180 years.
- Professional affiliations include the American Gas Association and the Edison Electric Institute. Former Executive Director of the American Gas Association Local Distribution Companies Caucus. Former member of the National Petroleum Council, the National Association of Regulatory Utility Commissioners, the Gas Research Institute Advisory Council, and the Federal Energy Regulatory Commission's Natural Gas Pipeline Competition Task Force.
- For 13 years, was the Chairman of the Maryland Public Service Commission (1982-95). Prior to his work at the Commission, Heintz was Executive Director of the Maryland Employment Security Administration, Special Assistant to the Lieutenant Governor, and a delegate in the Maryland Legislature.

Dudley J. Hughes

Independent

Flowood, Mississippi

- Recommended by the NPC Nominating Committee.
- Chairman of the Hughes-Rawls Corporation.
- Spent more than 35 years as an independent operator.
- Widely recognized for his work in earth sciences. Donated \$2 million to Texas A&M University's College of Geosciences and Maritime Studies.

Hillard Huntington

Stanford University

Executive Director, Energy Modeling Forum (EMF)

Stanford, California

- EMF provides a structured forum within which energy experts from government, industry, universities, and other research organizations meet to study important energy and environmental issues of common interest.
- Former President of the United States Association for Energy Economic and Vice-President for Publications for the International Association for Energy Economics. Former member of the American Statistical Association's Committee on Energy Data and served on a joint USA-Russia National Academy of Sciences panel on energy conservation research and development. Prior positions with Data Resources International and the Federal Energy Administration.

Ray R. Irani

Chairman and Chief Executive Officer

Occidental Petroleum Corporation

Los Angeles, California

- Former member of the NPC; recommended by the NPC Nominating Committee.
- World's largest independent oil and gas company based on combined oil and gas production. Second largest publicly-owned company based in Los Angeles.
- Corporate holdings include the Occidental Oil and Gas Corporation (assets in U.S., Middle East, and Latin America), Occidental Chemical Corporation (leading North American manufacturer and marketer of basic chemicals, as well as petrochemicals, polymers and plastics), and Occidental Energy Marketing Inc.
- Irani is on the Los Angeles Town Hall Board of Governors.

Sid J. Jansma, Jr.

President and Chief Executive Officer

Wolverine Gas and Oil Corporation

Grand Rapids, Michigan

- Recommended by the NPC Nominating Committee.
- Jansma sold a company with a similar name to Dominion Resources. Now reestablished as an independent producer.
- Member of the Board of Governors of the Independent Petroleum Association of America (IPAA) and Chairman of its Environment and Safety Committee.
- Director of Roc Oil Company Limited, Australia since 1998. ROC has assembled an international exploration and production portfolio which reflects the Company's core strategy whereby assets are acquired that have been generally undervalued or overlooked. The main areas where ROC believes it can identify appropriate opportunities and add value are West Africa, the Middle East and selected parts of Asia-Pacific and in its "niche areas" in the UK and Australia.

Francis D. John

Chairman and Chief Executive Officer

Key Energy Services, Inc.

Midland, Texas

- Recommended by the NPC Nominating Committee.
- World's largest well servicing company operating over 1,400 well servicing rigs and 79 drill rigs (onshore U.S., Argentina and Canada); total assets of over \$1 billion.
- Third largest land driller (via footage) in the United States with 75 drilling rigs.
- 8,500 employees in over 17 states; large Hispanic workforce.

George Kaiser

President

Kaiser-Francis Oil Company

Tulsa, Oklahoma

- Recommended by the NPC Nominating Committee.
- Privately held company engaged in oil and gas production and mineral mining ventures.
- Kaiser is also Chairman of the Board of BOK Financial Corporation (a multi-bank holding company with assets exceeding \$10 billion and centered in four bank subsidiaries: Bank of Albuquerque, Bank of Arkansas, Bank of Oklahoma and Bank of Texas) and Fountains Continuum of Care, Inc. (senior housing communities).

John Kaneb

Chief Executive Officer

Gulf Oil

Chelsea, Massachusetts

- Recommended by the NPC Nominating Committee. Wholesaler of refined petroleum products. Distributes gasoline and diesel fuel to over 1,800 Gulf-branded stations in 11 northeastern states. Owns and operates 12 storage terminals. Gulf Oil was established in 1901 with an oil strike in Spindletop, Texas. The oil company restructured into seven operating companies in the 1970's.
- Kaneb is also on the University of Notre Dame Board of Trustees.

W. Robert Keating

Commissioner

MA Dept of Telecommunications and Energy

Boston, Massachusetts

- Current Chairman of the National Association of Regulatory Utility Commissioners (NARUC), Committee on Gas and advisory committee member of the Gas Industries Standards Board.
- The MA Department of Telecommunications and Energy is responsible for the structure and control of monopoly telecommunications and energy in the Commonwealth; developing alternatives to traditional regulation and traditional monopoly arrangements; controlling prices and profits; monitoring service quality; regulating safety in the transportation and gas pipeline areas; and for the siting of energy facilities.

Kathy Lehne

Founder, President and Chief Executive Officer

Sun Coast Resources, Inc.

Houston, Texas

- One of the largest petroleum marketers in the Nation serving third-party customers (such as convenience stores, school districts, companies in the construction industry, and U.S. Coast Guard) in nine states (Arkansas, Florida, Kansas, Louisiana, Mississippi, Missouri, New Mexico, Oklahoma and Texas). Founded in 1985.
- Product lines includes gasoline, diesel, marine, jet, aviation fuels, kerosene, and oils lubricants.
- Recognized as one of the top ten women-owned companies in Houston in 2001 (Houston Business Journal).

James D. Lightner

President and Chief Executive Officer

Tom Brown, Inc.

Denver, Colorado

- Recommended as a replacement for retired NPC member, Donald C. Evans, now Secretary of Commerce (resignation effective 1-19-01).

- Tom Brown, Inc. is a Denver, Colorado based independent oil and natural gas production and marketing company that holds 1.9 million net acres in the major natural gas basins of Wyoming, Colorado, Utah, Texas, and Alberta, Canada. Acquired most of Unocal's Rocky Mountain oil and gas assets. Has also expanded its exploration and production operations in western Canada.
- Lightner has over 21 years of oil and gas industry experience.

Michael C. Linn

President

Allegheny Interests, Inc.

Pittsburgh, Pennsylvania

- Recommended by Jerry Jordan and NPC Nominating Committee.
- Linn works on oil and natural gas policy matters on behalf of independent producers; has served as Presidents of the Independent Oil and Gas Associations of New York, Pennsylvania, and West Virginia. Member of TIPRO.
- Also Linn Resources, LLC.
- Chairs various policy committees with the Independent Petroleum Association of America.

Aubrey K. McClendon

Chairman and Chief Executive Officer

Chesapeake Energy Corporation

Oklahoma City, Oklahoma

- Recommended by NPC Nominating Committee.
- One of the ten largest independent natural gas producers in the U.S. Currently is the sixth most active driller of natural gas wells in the U.S. with 24 rigs actively drilling in Oklahoma, Texas, Louisiana and New Mexico.
- McClendon co-founded the company.

William T. McCormick Jr.

Chairman and Chief Executive Officer

CMS Energy

Dearborn, Michigan

- Former member of the NPC; recommended by the NPC Nominating Committee.
- Utility and pipeline business in the mid-western United States. Internationally, CMS focuses on high-growth markets in the Middle East, India and South America.
- Chairman of Consumers Energy and member of Boards of Directors of Bank One Corp., Rockwell International Corp. and Schlumberger, Ltd.

W. Gary McGilvray

Chief Executive Officer and President

DeGolyer and MacNaughton

Dallas, Texas

- Recommended replacement for retiring NPC member Charles T. Bryan, DeGolyer and MacNaughton.
- DeGolyer and MacNaughton performs a variety of services related to the upstream sector of the petroleum industry, including evaluation of the hydrocarbon potential of exploration areas, estimation and classification of reserves to be recovered from new discoveries, verification of hydrocarbon reserves, production forecasting, and appraisal of properties for prospective acquisition, divestiture, issuance of securities, or financing purposes. Experience in North America and worldwide. During six decades, the firm has successfully performed studies on hundreds of thousands of petroleum properties in more than 100 countries.

Steven J. Malcolm

President and Chief Executive Officer
The Williams Companies Inc.
Tulsa, Oklahoma

- Recommended replacement for William Barrett, former Chairman and Chief Executive Officer of Barrett Resources which merged with Williams (August 2001).
- Spans the country with five interstate natural gas pipelines. Recent addition of MAPCO brought in refining and natural gas liquids pipelines.
- Malcolm is a member of the Gas Processors Association and a former board member.
- Member of the Southern Gas Association and the National Energy Services Association.
- Formerly worked for Cities Service Company in refining, marketing and transportation services.

Erle Nye

Chairman and Chief Executive Officer
TXU Corp.
Dallas, Texas

- Recommended replacement for David W. Biegler, former TXU President and Chief Operating Officer before retiring 12-31-01.
- TXU Corp. is a global energy services company. Engages in the generation, purchase and distribution of electricity, the purchase, transmission, distribution and sale of natural gas, and energy marketing. Delivers or sells energy to 11 million customers, primarily in the U.S., Europe and Australia; \$43 billion in worldwide assets.
- Nye is chairman of Edison Electric Institute. Served on the Board of Directors of the Electric Power Research Institute. Past Chairman of the North American Electric Reliability Council, Nuclear Energy Institute, and the Electric Reliability Council of Texas. Served on the Advisory Committee to the President's Commission on Critical Infrastructure Protection.
- Past Chairman of the Texas A & M University College of Engineering External Advisory and Development Council.

John Palmer

Chairman of the Board
Palmer Petroleum, Inc.
Shreveport, Louisiana

- Recommended by NPC Nominating Committee.
- Small Louisiana independent.
- Member of the Louisiana Independent Oil and Gas Association.
- Active in IPAA and regional organizations including the Gulf Coast Region Petroleum Technology Transfer Council Producers Advisory Group.

Glenn Patterson

President and Chief Operating Officer
Patterson-UTI Drilling Company, L.P.
Snyder, Texas

- Recommended by NPC Nominating Committee.
- Operates land-based oil and gas drilling rigs. Owns 302 drilling rigs, with operations in Texas, New Mexico, Utah, Oklahoma, Louisiana and western Canada.
- Formed as the result of a merger between Patterson Energy Inc. And UTI Energy Corp.
- Patterson co-founded Patterson Energy Inc.

James L. Payne

Chairman, President and Chief Executive Officer

Nuevo Energy Company

Houston, Texas

- Recommended by NPC Nominating Committee. Largest independent oil and gas exploration and production company in California. Principal domestic assets are located onshore and offshore California. International assets are located offshore the Republics of Congo and Ghana and offshore and onshore the Republic of Tunisia.
- Payne has over 40 years of experience in the oil and gas field.
- Serves on the President's Council of the Colorado School of Mines.
- Former Vice Chairman of Devon Energy Corporation. Outside director with BJ Services Company, Global Industries, Ltd. and Nabors Industries, Inc.

Raymond Plank

Chairman and Chief Executive Officer

Apache Corporation

Houston, Texas

- Former member of the NPC; recommended by NPC Nominating Committee.
- Explores for and produces oil and natural gas in the U.S., Canada, Australia, Egypt, Poland and China. In the U.S., Apache's strength is exploitation and development in mature basins. Internationally, Apache is an exploration company.
- Plank formed Apache in 1956.

John W. Rowe

President and Co-Chief Executive Officer

Exelon Corporation

Chicago, Illinois

- Recommendation of NPC Nominating Committee.
- Exelon is a supplier of electricity, natural gas and other energy business services comprised of three business units: Exelon Generation (serving more than 3.4 million electricity customers in Northern Illinois through ComEd and about 1.5 million electricity and 430,000 natural gas customers in Southeastern Pennsylvania through PECO Energy); Exelon Energy Delivery (one of the world's largest power producers and wholesale marketers); and Exelon Enterprises (telecommunications and other energy services). Exelon recently announced plans to divest its peripheral businesses and focus solely on electricity generation.

Mark Rubin

Executive Director

Society of Petroleum Engineers

Dallas, Texas

- Executive Director of the Society of Petroleum Engineers that serves as an important source for technical and professional development for its 52,000 members who live and work in more than 50 countries.
- Former Upstream General Manager for the American Petroleum Institute and current member of the Interstate Oil and Gas Compact Commission.
- Expands the Council's representation in the area of technical and professional societies related to the oil and natural gas industry.

Ray R. Seegmiller

Chairman of the Board, President and Chief Executive Officer

Cabot Oil & Gas Corporation

Houston, Texas

- Recommended by the NPC Nominating Committee.
- Domestic independent natural gas producer and marketer with substantial interests in the onshore Texas and Louisiana Gulf Coast, Rocky Mountains, Appalachia and Mid-Continent.

Scott D. Sheffield

Chairman, President and Chief Executive Officer

Pioneer Natural Resources Company

Irving, Texas

- Former member of the NPC; recommended by the NPC Nominating Committee.
- One of the top ten U.S. independent exploration and production companies. Active rig programs in the U.S., Argentina and Canada.

Sam Simon

Chief Executive Officer and President

Atlas Oil Company

Taylor, Michigan

- Recommended by the NPC Nominating Committee.
- Atlas Oil Company is the largest oil company in Michigan, supplying 60% of commercial and industrial market in that state; owns 120 retail locations.
- Sam Simon was elected by the Michigan offices of Ernst & Young as Entrepreneur of the Year.
- Member of the Society of Independent Gasoline Marketers of America (SIGMA) Board of Directors.

Bob R. Simpson

Chairman and Chief Executive Officer

XTO Energy Inc.

Fort Worth, Texas

- Recommended by the NPC Nominating Committee.
- XTO Energy Inc., formerly Cross Timbers Oil Company, is a large U.S. independent oil and natural gas production company, operating largely in the Rocky Mountain region.
- Holdings are mainly in Alaska, Arkansas, Texas, Kansas, New Mexico, Oklahoma and Wyoming. Owns interests in about 6,900 wells.
- Simpson co-founded Cross Timbers in 1986.
- Formerly Vice President of Finance and Corporate Development of Southland Royalty Company.

Bill Stewart

Chairman, President and Chief Executive Officer

BJ Services Company

Houston, Texas

- Recommended by the NPC Nominating Committee.
- Provides oilfield services serving the petroleum industry worldwide. The company's core business comprises cementing, stimulation, downhole tools and coiled tubing services. BJ also provides tubular services, process and pipeline services, and specialty chemical services in selected geographic markets. Corporate history dates back to 1872. Recent innovations include the BJ Blue Ray, reportedly the newest and most sophisticated stimulation vessel in the world, making its debut in the Gulf of Mexico in November 2001.

James Cleo Thompson

Independent Oil and Gas Producer, Ranching, Banking, Investments
Dallas, Texas

- Recommended by NPC Nominating Committee.
- Winner of 2001 Lone Star Steel's Roughneck Award.
- Managing General Partner, J. Cleo Thompson & James Thompson, Jr., engaged in the oil and gas exploration and production business since 1953 with properties located principally in Texas, New Mexico, Colorado and Oklahoma.
- President and Chairman of the Board, Thompson Petroleum Corporation, engaged in the oil and gas exploration and production business.
- Chairman of the Board of Trustees of the Hatton W. Sumners Foundation since 1974. The Foundation, which is located in Dallas, Texas, currently administers over 85 full law/government scholarships at 10 universities.
- Southern Methodist University Distinguished Alumnus 2000 and member of the Board of Trustees McGuire Energy Institute, Southern Methodist University.
- Member or affiliated with the Natural Gas Committee, Roustabout Club Member Independent Petroleum Association America, TIPRO, Hard Hatters, Society of Petroleum Engineers, Permian Basin Petroleum Museum Board.

Diemer True

Partner

True Companies, Inc.

Casper, Wyoming

- Recommended by Jerry Jordan and NPC Nominating Committee.
- Partner in True Oil Company since 1972; has worked in independent oil and natural gas business for over 30 years.
- Vice Chairman of Independent Petroleum Association of America.
- Wyoming House of Representatives - 1972-1976; Wyoming State Senate - 1991-1992.
- Board Member and Secretary, Mountain States Legal Foundation.

Paul G. Van Wagenen

Chairman, President and Chief Executive Officer

Pogo Producing Company

Houston, Texas

- Recommended by NPC Nominating Committee.
- Engaged in the exploration, development, and production of oil and natural gas. Acquired Noric Corporation and its subsidiaries adding over 537 billion cubic feet equivalent of gas. Owns interests onshore and offshore in the U.S., onshore in Canada, offshore in Thailand, Hungary, the United Kingdom and Danish sectors of the North Sea.
- Van Wagenen is a member of TIPRO.

Vincent Viola

Chairman of the Board

New York Mercantile Exchange

New York, New York

- Recommended by NPC as a replacement for Daniel Rappaport.
- World's largest physical commodity futures exchange, and a trading forum for energy, and precious metals in North America.
- Served as Vice Chairman of NYMEX Holdings, Inc. from 1993-1996.
- Graduate of U.S. Military Academy at West Point; achieved rank of major in the U.S. Army Reserves.
- Founder and sole owner of Pioneer Future Inc.

William Michael Warren, Jr.

Chairman, President and Chief Executive Officer

Energen Corporation

Birmingham, Alabama

- Recommended by NPC Nominating Committee.
- Diversified energy company with two subsidiaries: Alabama Gas Corporation (natural gas utility) and Energen Resources (oil and gas exploration and production).
- Chief Executive Officer of Alabama Gas Corporation and Energen Resources Corporation. Trustee of the Institute of Gas Technology. Former Chairman of the Southern Gas Association. Chairman of the American Gas Association in 2002.
- Director of Protective Life Corporation, a financial services company, and Associated Electric and Gas Insurance Services Limited, a mutual insurance company serving the U.S. public utility industry. Also a city Director of AmSouth Bank of Alabama,
- Active in civic matters and education, e.g., as member of Mountain Brook Board of Education, two-state wide education study commissions, Board of Trustees of Birmingham-Southern College, and former chairman of University of Alabama at Birmingham.

J. Robinson West

Chairman

The Petroleum Finance Company

Washington, DC

- Recommended by NPC Nominating Committee.
- Advises chief executives of leading national and international oil companies of corporate and international gas and power strategy, acquisitions, divestitures, and investor relations.
- West served in Reagan Administration as Assistant Secretary of the Interior for Policy, Budget and Administration (1981-83). Conceived of and implemented the first five-year OCS leasing plan in the U.S. Gulf of Mexico.
- Served in the Ford Administration as the Deputy Assistant Secretary of Defense for International Economic Affairs (1976-77) and on White House staff (1974-76).
- In 1976, West received the Secretary of Defense Medal for Outstanding Civilian Service.

Charles R. Williamson

Chairman and Chief Executive Officer

Unocal Corporation

El Segundo, California

- Recommended by NPC Nominating Committee.
- Large independent producer. Corporate business groups include North American Energy Operations and International Energy Operations (engaged in exploration and production of crude oil and natural gas in 14 countries with primary interests in the U.S. Gulf of Mexico, Thailand and Indonesia), Geothermal Operations, Unocal Midstream Trade (energy marketing/trading), Molycorp (lanthanides and molybdenum) and Real Estate Mediation Services (specific to mining operations).
- Member of the American Geological Institute Foundation.
- Geologist background domestically with Exxon Corporation and internationally with Unocal, including Europe and Asia.
- Member of the Stanford University Earth Sciences Advisory Board.

Donald D. Wolf

Chairman, Chief Executive Officer and Director

Westport Resources Corp. (Belco)

Denver, Colorado

- Recommended by NPC Nominating Committee.
- Independent energy company engaged in oil and natural gas exploitation, acquisition and exploration primarily within the U.S. Conducts operations in the Gulf of Mexico, the Rocky Mountains, West Texas/Mid-Continent and the Gulf Coast.
- Westport Resources Corporation was formed in 2000 with the merger of Westport Oil and Gas Company, Inc. and Equitable Production (Gulf) Company (EPGC). In 2001, Westport merged into Belco Oil and Gas Corp. (Belco) and Belco changed its name to Westport Resources Corporation. The combined company has proved reserves of about 1.1 trillion cu. ft. of natural gas equivalent, 54% of which is natural gas.
- Wolf has had a diverse 35 year career in the oil and gas industry including positions held as Chairman and CEO of General Atlantic Energy (1981) and President and Chief Operating Officer of UMC Petroleum (1994-6).

**National Petroleum Council Membership
Classification Distribution**

Organization Sector	2001	Reappoint	New	2002	%
Oil and Gas Industry					
Integrated Oil and Gas Companies	12	11	0	11	6%
Natural Gas and Energy Service Companies	17	15	11	26	14%
Independent Marketers and Refiners	13	9	4	13	7%
Independent Oil and Gas Producers	53	41	19	63	34%
Drilling, Service and Supply	15	15	4	17	9%
Chemical, Transportation and Other Companies	10	10	4	14	7%
Industry-Related					
Financial	6	4	3	7	4%
Research, Consultants and Other	20	12	6	18	10%
Non-Industry					
Academia	4	4	1	5	3%
States and Tribes	7	7	3	10	5%
Other Non-Industry	9	4	0	4	2%
Total	166	133	55	188	100%

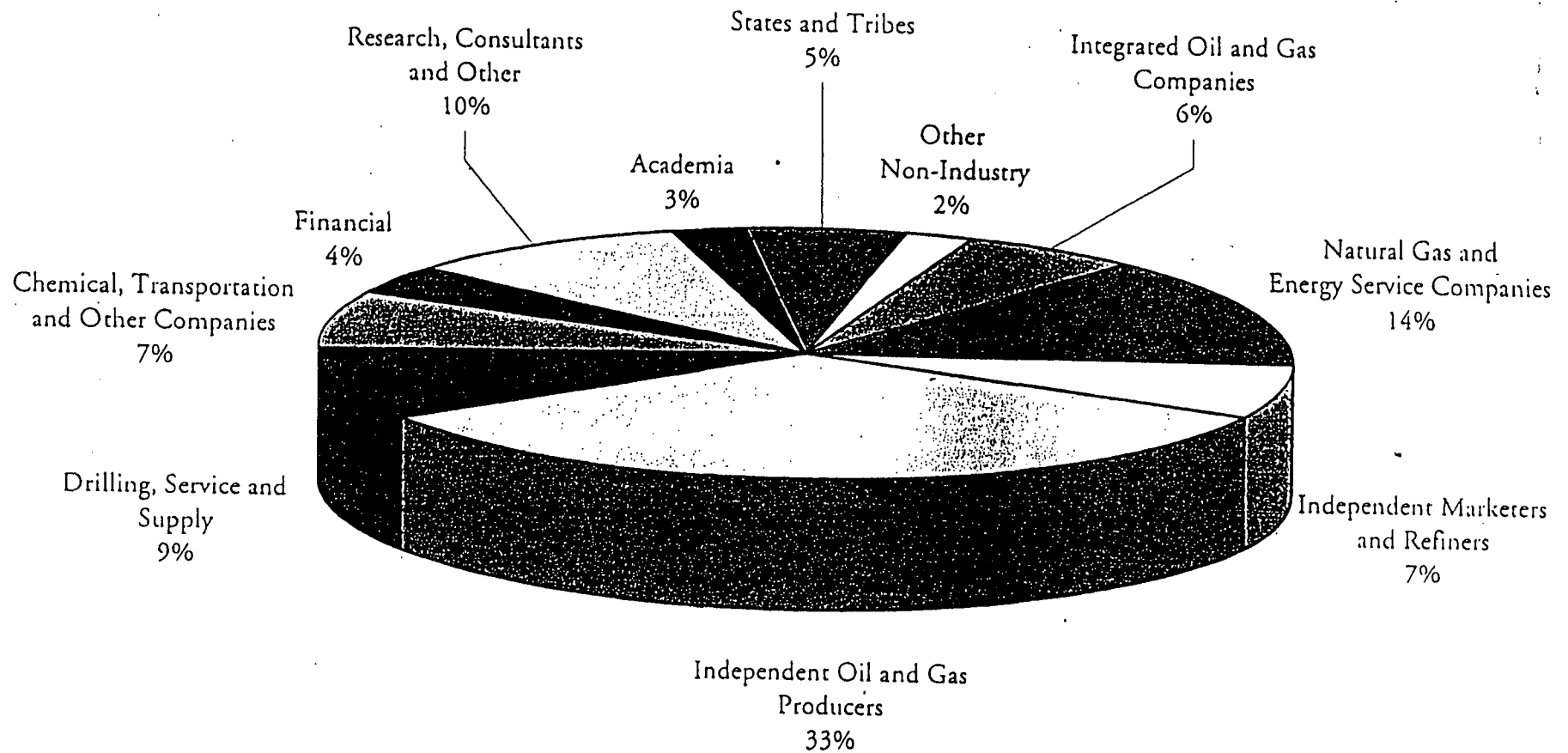
Diversity Representation					
Minority	25	19	0	19	10%
Woman	10	8	4	12	6%
Total	35	27	4	31	16%

*Percentages have been rounded to whole numbers.

H.

I.

National Petroleum Council Membership Classification Distribution 2002-2003



15.

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NATIONAL PETROLEUM COUNCIL
OTHERS CONSIDERED AND NOT RECOMMENDED FOR APPOINTMENT
2002-2003 TERM

Chairman and Chief Executive Officer

originally recommended [redacted] for membership to the Council. [redacted]
The NPC Nominating Committee judged [redacted] to be a more appropriate candidate
and contacted him in that regard. [redacted], however, reported that he is already committed to
the Secretary in other venues and is unavailable at this time to fulfill the requirements of Council
membership.

Assistant Vice President
Commodity Resources

Recommended by [redacted] Abdoo, Chairman and Chief Executive Officer, [redacted] in [redacted]
response to Secretary Abraham's August 15, 2001, letter. The recommendation was deemed
unsuitable to nominating standards and was reportedly withdrawn by [redacted] after
consultation with the NPC Nominating Committee.

Chief Executive Officer

[redacted] was identified as a possible candidate in early 2001. The NPC Nominating
Committee has since recommended [redacted] to replace [redacted] the retired
Chairman of CNG (after the merger with Dominion). [redacted] is currently the Chairman, [redacted]
President, and Chief Executive Officer of [redacted] Inc., the parent company of [redacted]

President

Recommended by [redacted] Chief Executive Officer, [redacted] in response to Secretary
Abraham's August 15, 2001, letter. The recommendation did not meet nominating standards.
[redacted] was deemed a more suitable candidate; he was contacted by the NPC Nominating
Committee and has agreed to serve if invited.

Managing Director and General Partner

Recommended by Congressman David Vitter (R-LA). The recommendation was deemed
unsuitable to nominating standards. If a representative of [redacted] is to be invited to
the Council, [redacted] current Chairman and Chief Executive Officer, would be a more
suitable candidate.

L.

M

**NATIONAL PETROLEUM COUNCIL
DEPARTING MEMBERS: 2002-2003 TERM**

Departing Member 2000-2001 Term	Proposed Replacement/New Member 2002-2003 Term
(b)(6) Advanced Technology Systems, Inc. (not oil and gas)	[opportunity for rotation]
(b)(6) DASCO Energy Corporation	[opportunity for rotation]
(b)(6) Truman Arnold Companies (resigned with recommended replacement; Secretary sent letter 7/25/01 thanking him for his service on the Council)	(b)(6) Truman Arnold Companies
Barrett Resources Corporation (acquisition by Williams)	Williams
(b)(6) Michael L. Beatty & Associates (referred to National Coal Council for future consideration)	[opportunity for rotation]
(b)(6) TXU Corporation (retired December 31, 2001)	(b)(6) Chairman and Chief Executive Officer TXU Corporation
DeGolyer and MacNaughton, Inc. (resigned with recommended replacement)	(b)(6) DeGolyer and MacNaughton, Inc.
(b)(6) Oasis Aviation, Inc. (change of business focus)	[opportunity for rotation]
(b)(6) Jones, Day, Reavis, Pogue	[opportunity for rotation]

N.

Departing Member 2000-2001 Term	Proposed Replacement/New Member 2002-2003 Term
Cooper Union for the Advancement of Science and Art (no longer involved in oil and gas business)	[opportunity for rotation]
Philcon Development Company (deceased)	[opportunity for rotation]
Bank of America (no longer involved in oil and gas business)	[opportunity for rotation]
Dominion Resources, Inc. (retired; Secretary sent letter 7/25/01 accepting his resignation from the Council)	Chairman, President and Chief Executive Officer
Tom Brown, Inc. (resigned; appointed Secretary of Commerce)	President and Chief Executive Officer Tom Brown, Inc.
Halliburton Company (duplicate due to job change)	Halliburton Company (current Council member)
Attorney Gallegos Law Firm	[opportunity for rotation]
Ultramar Diamond Shamrock Corporation (merger/acquisition and retiring)	Valero Energy Corporation
MCN (resigned/MCN merged with DTE Energy)	DTE Energy
Osyka Corporation	[opportunity for rotation]

Departing Member 2000-2001 Term	Proposed Replacement/New Member 2002-2003 Term
(b)(6) Headington Oil Company	[opportunity for rotation]
(b)(6) Sinclair Oil Corporation	[opportunity for rotation]
(b)(6) HUTCO Inc. (change of corporate focus)	[opportunity for rotation]
(b)(6) Noble Affiliates, Inc.	Noble Affiliates, Inc.
(b)(6)	[opportunity for rotation].
Enron Corporation	[opportunity for rotation]
(b)(6) Leathers Oil Company	[opportunity for rotation]
(b)(6) Colonial Pipeline Company	[opportunity for rotation]
(b)(6) Petroleum Industry Research Foundation	(b)(6) Petroleum Industry Research Foundation
(b)(6) J.P. Morgan Securities, Inc.	J.P. Morgan Securities, Inc.

Departing Member 2000-2001 Term	Proposed Replacement/New Member 2002-2003 Term
<div>10/6</div> Premier Energy Supply Corporation (change of corporate focus)	<div></div> [opportunity for rotation]
<div>11/8</div> Mitchell Energy and Development Corp. (merger/acquired by Devon)	<div>12/9</div> Devon Energy Corporation (current Council member)
<div>12/9</div> Louis Dreyfus Natural Gas (merger/acquisition)	<div>10/6</div> Dominion [see also retired member]
<div>10/6</div> from Broken Hill PC, Ltd.,	<div>12/9</div> The Broken Hill Proprietary Company, Ltd.
<div>10/6</div> New York Mercantile Exchange	<div>10/6</div> New York Mercantile Exchange
<div>11/8</div> National Bank of Alaska (merger/acquisition)	<div></div> [opportunity for rotation]
<div>10/6</div> Simmons Royalty Company	<div></div> [opportunity for rotation]
<div>10/6</div> Arlie M. Skov, Inc.	<div>10/6</div> Society of Petroleum Engineers
<div>10/6</div> Panhandle Producing Company (change of business focus)	<div></div> [opportunity for rotation]

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SAMPLE LETTER - Member Leaving Council/Thank You for Service

Dear Mr./Ms. _____:

Thank you for your service on the National Petroleum Council during the 2000-2001 membership term. The Council has a long history of contributing to the energy strength, security, and stability of our Nation, and addressing society's shared environmental concerns. This has been made possible by individuals like yourself who have unselfishly given their time and talents.

Please accept my sincere gratitude for your past efforts and support. I hope that I may call on you again in the future.

Sincerely,

Spencer Abraham

P.

SAMPLE LETTER - Invitation to Serve on Council

Dear Mr./Ms. _____:

It is my pleasure to invite you to serve as a member of the National Petroleum Council, a key advisory body to the Secretary of Energy, for the 2002-2003 membership term. Created by President Truman in 1946 to continue industry and government cooperation that began during World War II, the Council provides essential advice, information, and recommendations on matters relating to oil and gas and their respective industries.

In May 2001, President Bush issued a comprehensive National Energy Policy, that recognizes the critical role that oil and natural gas play in the national economy. To address the many challenges identified in the Policy, the expertise of recognized leaders in the oil and natural gas industry and associated interests will be invaluable. The National Petroleum Council's work during the 2002-2003 term will be important to the Administration and the Department as government and industry strive to meet the Nation's future energy needs.

I am certain you will find your association with the Council both challenging and rewarding. Please join me at the next Council meeting in Washington, D.C. on April 10, 2002.

I hope you will accept this appointment. You will receive an information package from the Council shortly. If you have any questions, please feel free to call Mr. Marshall Nichols, the Council's Executive Director, on (202) 393-6100, or Ms. Nancy Johnson, the Director of Natural Gas and Petroleum Planning and Environmental Analysis, Office of Fossil Energy, on (202) 586-6458.

Sincerely,

Spencer Abraham



SAMPLE LETTER - Condolence Letter/ Thank You for Service
*[Mr. Conklin died on October 31, 2001 and is survived by his spouse Carolyn
Kerns Conklin.]*

Mrs. Daniel H. Conklin
c/o Philcon Development Company
First National Place One
Suite 730
Amarillo, Texas 79101

Dear Mrs. Conklin:

I am writing to send my condolences to you and your family on the loss of your husband, Daniel H. Conklin. I also want to express my appreciation for his many years of service on the National Petroleum Council. The Council has a long history of contributing to the energy strength, security, and stability of our Nation, and addressing society's shared environmental concerns. We greatly appreciate Mr. Conklin's prior service as a Council member. His willingness to contribute time and effort to the Council's work was a significant gift to the Nation.

Sincerely,

Spencer Abraham

R.

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DEPARTMENT OF ENERGY

CHARTER

NATIONAL PETROLEUM COUNCIL

1. Committee's Official Designation:

National Petroleum Council (NPC).

2. Committee's Objectives and Scope of Activities and Duties:

To provide advice, information, and recommendations to the Secretary of Energy on matters relating to oil and gas and the oil and gas industry.

3. Time Period Necessary for the Committee to Carry Out its Purpose:

In view of the goals and purposes of the Council, it is expected to continue in nature.

4. Officials to Whom this Committee Reports:

The Council will report to the Secretary of Energy.

5. Agency Responsible for Providing Necessary Support for this Committee:

The Department of Energy. Within the Department of Energy, primary support will be furnished by the Office of Fossil Energy.

6. A Description of Duties for Which the Committee is Responsible:

The duties of the Council are solely advisory and are stated in paragraph 2 above.

7. Estimated annual Operating Costs in Dollars and Man-years:

\$100,000; one-half person year.

8. Estimated Number and Frequency of Committee Meetings:

The Council will meet approximately twice a year, as required. Subcommittees will also meet as required.

9. Committee's Termination Date (if less than 2-years from the date of establishment or renewal):

No applicable.

T.

10. Subcommittee(s):

To facilitate functioning of the Council, subcommittee(s) may be formed. The objectives of the subcommittee(s) are to make recommendations to the Council with respect to matters related to the responsibilities of the Council.

11. Members:

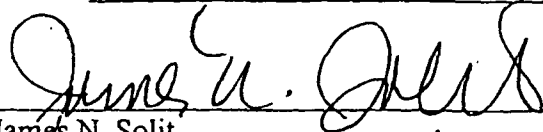
Council members shall be appointed by the Secretary of Energy for a term of up to two years. The appointments may be renewed subject to review by the Secretary of Energy and concurrent with renewal of the Charter. Approximate number of members: 175.

12. Chairperson:

The chairperson shall be elected by the members of the Council.

NOV - 1 2001

Date: _____


James N. Solit
Advisory Committee Management Officer

NOV - 1 2001

Date Filed: _____

BACKGROUND INFORMATION ON THE NATIONAL PETROLEUM COUNCIL

The National Petroleum Council (NPC) is an advisory body to the Secretary of Energy that was established by President Truman in 1946 to provide advice on issues related to oil and natural gas issues, or the oil and natural gas industries. Its members are senior executives representing the Nation's oil and gas producing, service and transport companies, the financial community, academia, consumer and environmental groups, States, and other diverse interests. The Council conducts its work primarily through the conduct of studies, and is subject to the provisions of the Federal Advisory Committee Act of 1972.

Examples of recent major studies undertaken by the NPC at the request of the Secretary of Energy include:

- U.S. Arctic Oil & Gas (1981)
- Environmental Conservation – The Oil & Gas Industries (1982)
- Third World Petroleum Development: A Statement of Principles (1982)
- Petroleum Inventories and Storage Capacity (1983, 1984)
- Enhanced Oil Recovery (1984)
- The Strategic Petroleum Reserve (1984)
- U.S. Petroleum Refining (1986)
- Factors Affecting U.S. Oil & Gas Outlook (1987)
- Integrating R&D Efforts (1988)
- Petroleum Storage & Transportation (1989)
- Industry Assistance to Government – Methods for Providing Petroleum Industry Expertise During Emergencies (1991)
- Short-Term Petroleum Outlook – An Examination of Issues and Projections (1991)
- Petroleum Refining in the 1990s – Meeting the Challenges of the Clean Air Act (1991)
- The Potential for Natural Gas in the United States (1992)
- U.S. Petroleum Refining – Meeting Requirements for Cleaner Fuels and Refineries (1993)
- The Oil Pollution Act of 1990: Issues and Solutions (1994)
- Marginal Wells (1994)
- Research, Development, and Demonstration Needs of the Oil and Gas Industry (1995)
- Future Issues – A View of U.S. Oil & Natural Gas to 2020 (1995)
- Issues for Interagency Consideration – A Supplement to the NPC's Report: Future Issues – A View of U.S. Oil & Natural Gas to 2020 (1996)
- U.S. Petroleum Product Supply – Inventory Dynamics (1998)
- Meeting the Challenges of the Nation's Growing Natural Gas Demand (1999)
- U.S. Petroleum Refining – Assuring the Adequacy and Affordability of Cleaner Fuels (2000)
- Critical Infrastructure Protection: Securing the Oil and Natural Gas Industries in the New Economy (2001)

Department of Energy Contacts:
Nancy Johnson, 202/586-6458
Margie Biggerstaff, 202/586-3867

INTERNATIONAL PETROLEUM COUNCIL MEMBERSHIP: 2002-2003 TERM
NEW APPOINTMENTS

new

(Nominating committee)

The Broken Hill Proprietary Company, Ltd.
Melbourne, Victoria, Australia

Truman Arnold Companies
Texarkana, TX

Sempra Energy
San Diego, CA

Flour Corporation
Aliso Viejo, CA

Bollinger Shipyards, Inc.
Lockport, LA

XCEL Energy, Inc.

INTERNATIONAL PETROLEUM COUNCIL MEMBERSHIP LIST
NEW APPOINTMENTS

(b)(6)

EMC Holdings, LLC
Houston, TX

(b)(6)

Dominion Resources
Richmond, VA

(b)(6)

Association of American State Geologists
Denver, CO

(b)(6)

Noble Affiliates, Inc.
Houston, TX

(b)(6)

American Electric Power, Inc.
Columbus, OH

(b)(6)

DTE
Detroit, MI

National Petroleum Council Membership 1992-1993 Term
NEW APPOINTMENTS

(b)(6)

Trade-Ranger
Houston, TX

(b)(6)

(b)(6)

(b)(6)

Energy Council
Dallas, TX

(b)(6)

Southern Company
Atlanta, GA

(b)(6)

Petroleum Industry Research Foundation, Inc.
New York, NY

(b)(6)

(b)(6)

Valero Energy Corporation
San Antonio, TX

(b)(6)

American Association of Petroleum Geologists
Tulsa, OK

National Petroleum Council Membership, 2002-2003 Term
NEW APPOINTMENTS

(b)(6)

Ocean Energy, Inc.
Houston, TX

(b)(6)

FLP Group, Inc.
Juno Beach, FL

(b)(6)

Baltimore Gas and Electric Co.
Baltimore, MD

(b)(6)

Independent
Flowood, MS

(b)(6)

Stanford University Energy Modeling Forum
Stanford, CA

(b)(6)

Occidental Petroleum Corporation
Los Angeles, CA

National Petroleum Council Membership 1900-1905
NEW APPOINTMENTS

10/16
Sicer

Key Energy Services, Inc.
Midland, TX

10/16
(b) (6)

Kaiser-Francis Oil Company
Tulsa, OK

(b) (6)

Gulf Oil
Chelsea, MA

7(b)(6)

(b) (6)

MA Dept of Telecommunications and Energy
Boston, MA

National Petroleum Council Membership: 2002-2003 Term
NEW APPOINTMENTS

7-Eleven
Dallas, TX

Sun Coast Resources, Inc.
Houston, TX

Tom Brown, Inc.
Midland, TX

Allegheny Interests, Inc.
Pittsburgh, PA

The Williams Companies, Inc.
Tulsa, OK

Chesapeake Energy Corporation
Oklahoma City, OK

NATIONAL PETROLEUM COUNCIL
NEW APPOINTMENTS

[
CMS Energy
Dearborn, MI

7(b)(6) 7(c)

DeGolyer and MacNaughton Inc.
Dallas, TX

(b)(6)

7(b)(6)

Murfin Drilling Co., Inc.
Wichita, KS

(b)(6)

Muskegon Development
Mt. Pleasant, MI

7(b)(6)

TXU Corp.
Dallas, TX

7(b)(6)

7(b)(6)

Palmer Petroleum, Inc.
Shreveport, LA

National Petroleum Council
NEW APPOINTMENTS

Patterson-UTI Drilling Company, L.P.
Snyder, TX

(b)(6)
(b)(6)

Nuevo Energy Company
Houston, TX

(b)(6)
(b)(6)

Jane Lew, WV

(b)(6)

Apache Corporation
Houston, TX

(b)(6)
(b)(6)

Exelon Corporation
Chicago, IL

(b)(6)
(b)(6)

Society of Petroleum Engineers
Richardson, TX

(b)(6)

(b)(6)

National Petroleum Council Membership, 2002-2003 Term
NEW APPOINTMENTS

B) (b)(6) (b)(6)

(b)(6) (b)(6)

S.W. Jack Drilling Company
Indiana, PA

(b)(6) (b)(6)

(b)(6) (b)(6)

True Companies, Inc.
Casper, WY

(b)(6) (b)(6)

(b)(6) (b)(6)

Pogo Producing Company
Houston, TX

(b)(6) (b)(6)

(b)(6) (b)(6)

New York Mercantile Exchange
New York, NY

(b)(6) (b)(6)

(b)(6) (b)(6)

Energen Corp.
Birmingham, AL

(b)(6) (b)(6)

(b)(6) (b)(6)

The Petroleum Finance Company
Washington, DC

National Petroleum Council Membership: 2002-2003
NEW APPOINTMENTS

(
(b)(6)
(b)(6)
Unocal Corporation
El Segundo, CA

(
(b)(6)
(b)(6)
Westport Resources Corp.
Denver, CO

Phone Calls

There were only two phone calls found in the Secretary's phone log pertaining to Kenneth Lay, Linda Robertson or other Enron officials.

- February 6, 2001 – The Secretary received a phone call from Kenneth Lay.
- November 2, 2001 – The Secretary placed a phone call to Kenneth Lay.

The Secretary responded that he telephoned Mr. Lay to ask about the situation after reading news reports about the company's financial problems. He said Mr. Lay did not ask for any help and that he seemed to convey the situation was improving, but could not disclose details. Several days later on November 8, 2001 Enron announced the Dynergy merger talks, which the Secretary assumed was the reason for the brief and optimistic phone conversation. [The Secretary recalls the February 6 call from Mr. Lay as regarding an invitation to speak at an event.]

Meetings

There were no meetings or records of any meetings between the Secretary and Kenneth Lay or Linda Robertson or any other Enron official. The following five requests were received from Mr. Lay and other Enron officials to meet with the Secretary, but all five requests were declined.

- Request for Dr. Lay meeting with Secretary Abraham on April 6, 2001. The request was declined. (Control #2001-009085)
- Request for Dr. Lay meeting with Secretary Abraham on April 4, 2001. The request was declined. (Control #2001-009085)
- Request for R.T. Hap Boyd of Enron Wind Corp. meeting with Secretary Abraham, dated July 31, 2001. The request was declined. (Fax - Control #2001-018057; Letter - Control #2001-018326)
- Request for Jeff Skilling, CEO of Enron, meeting with Secretary Abraham on September 11, 2001. The request was declined. (Control #2001-018818)
- Request for Dr. Lay meeting with Secretary Abraham on September 18 or September 19, 2001. The request was declined. (Fax1-Control#2001-020031; Fax2-Control #2001-020504)

The search found only two "records of meetings involving the Office of the Secretary and officials of the Enron Corporation, including Kenneth Lay and Linda Robertson." The search found the following:

topic → general intro new V Chairman

- Schedule of Deputy Secretary Francis Blake for September 19, 2001 includes a meeting with Enron Vice Chairman Mark Frevert and Steven Kean and Linda Robertson of Enron.
- Letter from to Chief of Staff Kyle McSlarrow requesting a meeting on May 23, 2001 for Rick Shapiro and Linda Robertson of Enron and David R. Lugar of Quinn Gillespie & Associates. The meeting discussed ideas on how to address the electricity crisis in California. (Control #2001-012714)

intown
for
Fuels
Conference
speech
gas &
energy
legislation

A search of Under Secretary Robert Card's meeting records and correspondence found no items involving "officials of the Enron Corporation, including Kenneth Lay and Linda Robertson."

release

Washington, Charles

From: Washington, Charles
Sent: Friday, June 29, 2001 7:05 AM
To: 'Clayton.Seigle@enron.com%internet'
Subject: RE: meeting

Hi Clay, thanks for writing and I look forward to meeting you. Unfortunately I was unable to make the trip to Texas, and also, I am out all next week. I will return to work on July 9th. Please feel free to e-mail or call me at any time (202-586-5154). Thanks

-----Original Message-----

From: Clayton.Seigle@enron.com%internet
[mailto:Clayton.Seigle@enron.com]
Sent: Thursday, June 28, 2001 5:07 PM
To: Washington, Charles
Subject: meeting

Hi Chuck:

I saw your name on the list at the ME conference in Houston last week, but did not get a chance to say hi. I am an oil market analyst for Enron and I focus esp on the Middle East. I used to work at EIA and I had a nice dialogue with Bob Copaken when he was there.

If you are around next Friday July 6 maybe I can stop in and chat.

Thanks

Clay Seigle
Senior Market Analyst
Enron Global Markets


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Benson, Erika

ENRON

From: Caranti, Guido [Guido.Caranti@enron.com]
Sent: Wednesday, July 25, 2001 7:47 PM
To: Benson, Erika
Cc: Hardy, John; Briggs, Tom
Subject: Venezuela LNG Exports

(4)


Additional Info Vzla
gas export...

Erika: Tom Briggs from Enron's Governmental Affairs department told me that you were responsible for briefing Francis Blake and Ronda Houdone for their meeting with the Venezuelan Ministry of Energy and PDVSA officials. Tom told me that he was going to talk to you on the phone, but we also thought that it was good to send you this additional information in writing. I am enclosing two paragraphs in a "word" file that describe important developments over the past few weeks. Please give me a call at 713 304-4264 or call John Hardy 202 466-9156 in our Washington office if you have any questions about it.

We think this is a key development that is very important for the conversations that the Department of Energy will hold with the Venezuelan officials.

Thanks a lot.

Guido Caranti
Enron Global Markets L.L.C.
Global LNG

<<Additional Info Vzla gas exports.doc>>

(5)

Benson, Erika

ENRON

From: Tom.Briggs@enron.com%internet [Tom.Briggs@enron.com]
Sent: Wednesday, July 25, 2001 9:59 AM
To: Benson, Erika
Subject: PDVSA letter



LamedaLetter july 9
2001.doc

I hope that this confidential letter is useful. I look forward to working with you.

(See attached file: LamedaLetter july 9 2001.doc)

Washington, Charles

From: Washington, Charles
Sent: Monday, June 18, 2001 7:33 AM
To: FELD, LOWELL
Subject: RE: Country Analysis Briefs (all countries; Middle East; OPE

Hi Lowell, unfortunately, all I know is what's in the media.

-----Original Message-----

From: FELD, LOWELL
Sent: Wednesday, June 13, 2001 12:38 PM
To: Washington, Charles; James, Wynne
Subject: FW: Country Analysis Briefs (all countries; Middle East; OPE

Chuck/Wynne: Per the question from one of Enron's oil market analysts below,
do
you have any insights into WHY Saudi Arabia decided to seize the IPSA line,
and-
also why NOW? Thanks. -- Lowell Feld, EIA

-----Original Message-----

From: Clayton.Seigle@enron.com [mailto:Clayton.Seigle@enron.com]
Sent: Tuesday, June 12, 2001 2:46 PM
To: lowell.feld@eia.doe.gov
Subject: Re: Country Analysis Briefs (all countries; Middle East; OPEC)

any insight into saudi seizure of ipsa 2 line, esp in light of recent reports of
border skirmishes with iraq?

Person, George

From: Pumphrey, David
Sent: Monday, September 24, 2001 9:29 AM
To: Person, George; Benson, Erika; Lockwood, Andrea
Subject: RE: Industry/Interagency Roundtable on Venezuela

I believe that Juanita has kept that list. Unfortunately she's not here today.

—Original Message—

From: Person, George
Sent: Monday, September 24, 2001 9:26 AM
To: Benson, Erika; Lockwood, Andrea
Cc: Pumphrey, David
Subject: RE: Industry/Interagency Roundtable on Venezuela

Erika,

As discussed, you should start to work more closely with Andrea. Based on a voice mail, she will be in tomorrow and, as needed, is available by phone.

On this action, we need to ensure that we invite a broader range of private sector reps and avoid even the appearance of excluding some. Using a few associations may be the best approach.

Dave,

Is there a standard mailing list for the industry dialogue exercise we've done previously?

Thanks.

George

—Original Message—

From: Benson, Erika
Sent: Monday, September 24, 2001 9:11 AM
To: 'John.Hardy@enron.com'; 'Shiptrans@aol.com%internet'; 'Tom.Briggs@enron.com%internet'
Cc: Lockwood, Andrea; Pumphrey, David; Person, George
Subject: Industry/Interagency Roundtable on Venezuela

Recent concerns about the investment climate in Venezuela and the upcoming Principal Coordinators Meeting for the Department of Energy, has prompted an Industry/Interagency Roundtable next Friday September 28th at 10am-12pm at DOE. (Exact room number will be sent)

The Industry portion, the first hour, will be chaired by our new Assistant Secretary for Policy and International Affairs, Vicky Bailey.

Please let Andrea Lockwood (202-586-6082) or I know if you have any questions. Please let us know if you can attend.

Thanks,

Erika Benson
Office of Policy and International Affairs
U.S. Department of Energy
202-586-6531

Participant List
Industry/Interagency Roundtable on Venezuela
September 28, 2001

Industry Representatives:

Executive Director, U.S.-Venezuelan Business Council
Venezuelan-American Chamber of Commerce
Domestic Petroleum Council
BP-Amoco
Chevron
Texaco
Exxon-Mobil
Conoco
Enron
Amareto-Hess
Halliburton
CMS Energy
AES
Cargill
Tomen America
Trans Mar Coal
Burlington Resources

(Verizon, BellSouth and Merck were invited, but have not confirmed)

United States Government Representatives:

Department of Energy:

Vicky Bailey, Assistant Secretary
Office of Policy and International Affairs, DOE

Randa Hudome, Senior Advisor for International Affairs
Office of the Secretary, DOE

David Pumphrey, Deputy Assistant Secretary for International Energy Cooperation
Office of Policy and International Affairs, DOE

Andrea Lockwood, Office of American and African Affairs
Office of Policy and International Affairs, DOE

Erika Benson, Office of American and African Affairs
Office of Policy and International Affairs

Moustafa Soliman, Office of Science and Technology
Office of Policy and International Affairs, DOE

Donald Juckett, Director
Office of Fossil Energy, DOE

Ann Ducca, Team Leader, International Division
Office of Fossil Energy, DOE

Harvetta Asamoah,
General Counsel's Office, DOE

Tara Billingsley, Office of Energy Markets and End-use
Energy Information Administration

Department of State:

Matthew McManus, Director
Energy Bureau

James Dudley, Economist
Energy Bureau

Brian Naranjo
Venezuela Desk Officer

Mary Brett Rogers
Office of Investment Affairs

Department of Commerce:

Tom Welch
Venezuela Desk Officer

Department of Treasury:

Greg Christopolis

Dirk Joldersma

United States Trade Representative:

David Katz

Central Intelligence Agency:

Mike Matthews

Andy Bennett

Congressional Staff:

Ted Brennan, Professional Staff

Subcommittee on Western Hemisphere Affairs

Folder Profile

Control # 2001-018818 Name Letter to Secretary Abraham from Linda Robertson, Vice F

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-O

Spencer Abraham

Date Received 8/10/01

Subject Text

Correspondence Date 8/10/01

Linda Robertson writes on behalf of Jeff Skilling, CEO of Enron who would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition & upcoming legislation

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Regular

Classification None

Signature/Approval

Point of Contact CUNNINGD

NA

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Johnston

Special Instructions

Date Due

8/22/01 regretted by phone w/Laura

Date Completed 8/13/01

08/10/01 12:40 FAX

AUG 10 2001 12:04 PM ENRON

2001-018818 8/10/01 1:39

TO 5867573

0001

P.01/01

018818



Linda L. Robertson
Vice President
Federal Government Affairs

Enron
1775 Eye Street, NW, Suite 800
Washington, DC 20006
202-466-9159
Fax 202-828-3372
linda.robertson@enron.com

VIA FAX
202-586-7573 (fax)

August 10, 2001

The Honorable Spencer Abraham
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585
Attention: Ms. Cheryl Alford, Scheduler

Dear Ms. Alford:

Jeff Skilling, CEO of Enron would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition and upcoming legislation. Mr. Skilling is available for a meeting in Washington, DC on Tuesday, September 11, 2001 in the afternoon if this is possible.

At your convenience, please call me at 202-466-9159. I look forward to talking with you.

Sincerely,

A handwritten signature in cursive script, reading "Linda L. Robertson".

A

2001-018818-Namelist

Linda L. Robertson
Vice President
Federal Government Affairs
ENRON
1775 Eye Street, NW
Suite 800
Washington, DC 20005

B

Folder Profile

Control # 2001-020031 Name Fax to Secretary Abraham from Linda L. Robertson (Enron)

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-O

Spencer Abraham

Date Received 8/29/01

Subject Text

Correspondence Date 8/28/01

Linda L. Robertson, ENRON, would like to meet with Secretary Abraham in Washington, D.C., 9/18/01 or 9/19/01, to discuss electricity issues

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Regular

Classification None

Signature/Approval

Point of Contact SEISERP

NA

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Johnston

Date Due

Special Instructions

Info copy: ES/Carpenter

Date Completed 8/30/01

heave the a

AUG 29 2001 09:30 FR ENRON

TO 5867573

P.01/01

2001-020031 Aug 29 A 10:29



Linda L. Robertson
Vice President
Federal Government Affairs

Enron
1775 Eye Street, NW, Suite 800
Washington, DC 20006
202-466-9159
Fax 202-828-3372
linda.robertson@enron.com

VIA FAX
202-586-7573 (fax)

August 28, 2001

Ms. Robin Johnston
Scheduler
The Honorable Spencer Abraham
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Dear Ms. Johnston:

Ken Lay, Chairman and CEO of Enron would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition, and upcoming electricity legislation. Dr. Lay is available for a meeting in Washington, DC from September 18 through September 19, 2001.

At your convenience, please call me at 202-466-9159. I look forward to talking with you.

Sincerely,

A handwritten signature in cursive script that reads "Linda Robertson". The signature is fluid and matches the printed name above it.

Endless possibilities.™

** TOTAL PAGE.01 **

A

Namelist - 8/29/01

Linda L. Robertson

Vice President

Federal Government Affairs

ENRON

1775 I Street, NW, Suite 800

Washington, D.C. 20006

19

Folder Profile

Control # 2001-001758

Name Invitation to Secretary Spencer Abraham from Kenneth La

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-I

Spencer Abraham

Date Received 1/24/01

Subject Text

Correspondence Date 1/22/01

Mr. Kenneth Lay of Enron Business Council invites Secretary Abraham to address the morning session of the winter meeting on February 22, 2001, in Washington, DC

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Regular

Classification None

Signature/Approval

Point of Contact HOLLOWAG

NA

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Johnston

Special Instructions

Date Due

Info copy: ES/Carpenter

Date Completed 1/24/01

01/24/01 11:17 FAX

01/24/01 11:02 FAX

JAN 24 2001 09:36 FR ENRON

0001

0001

P.01/01

TO 5867644

2001-001758 1/24 A 11:50



January 22, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Kenneth L. Lay
Chairman and
Chief Executive Officer

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
(713) 853-6773
Fax (713) 853-5323
klay@enron.com

Dear Spencer:

In my capacity as Vice Chairman of the Business Council, I am writing to invite you to address the morning session of our winter meeting at the Park Hyatt Hotel in Washington, DC on February 22, 2001. If you are able to join us, which we very much hope you are, we will work with your staff to determine the most convenient time for you to speak. We envisage about a 20-minute speech with 10 to 15 minutes with our members.

The Council, formed in 1993, is a voluntary association of America's top 100 or so business leaders dedicated to service in the national interest. As a gathering of current and former Chief Executive Officers from virtually every major industry, the Council is entirely an educational and deliberative forum. The Council does not take positions as an organization; instead, it provides a forum for exchange between the leaders of the US business and government communities in an effort to achieve greater understanding and consensus on the important issues facing our country.

Our winter meeting is held in Washington, DC in order to facilitate broad participation by our nation's top political leaders including the President, Cabinet officers and Congressional majority and minority leaders. We would be delighted to have your participation at this winter's event.

Please feel free to call me directly, or have someone on your staff contact Philip Cassidy (Business Council) at 202-298-7650 or Linda Robertson (Enron) at 202-466-9159.

Sincerely,

Ken

Post-It® Fax Note	7871	Date	1/24	1 of 1 pages
To	Schedule	From	Ken Lay	
Co/Dept		Co.	ENRON	
Phone #		Phone #		
Fax #	586-7644	Fax #		

Natural gas. Electricity. Endless possibilities.™

*** TOTAL PAGE. 01 ***

A

Namelist (2001-001758)

January 22, 2001

Kenneth L. Lay
Chairman
Chief Executive Officer
Enron Corp
P.O. Box 1188
Houston, Texas 77251-1188

B

Folder Profile

Control # 2001-001530

Name Letter to Secretary Spencer Abraham from Kenneth L. Lay

Priority Important Critical

Folder Trigger Letter

DOE Addressee

Spencer Abraham

Source PM-O

Date Received 1/23/01

Subject Text

Invites Secretary Abraham to address the morning session of the winter meeting at the Park Hyatt Hotel – February 22, 2001

Correspondence Date 1/22/01

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Regular

Classification None

Signature/Approval

NA

Point of Contact ALSTONL

Organization ID EXECCORR2

Action Requested

Appropriate Action

Assigned To

SL/Johnston

Special Instructions

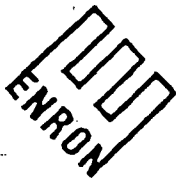
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Date Due

Date Completed 1/23/01

accept - held on 2/22/01

2001-001530 Jan 23 A7:28



Kenneth L. Lay
*Chairman and
Chief Executive Officer*

January 22, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Enron Corp.
P. O. Box 1188
Houston, TX 77251-1188
(713) 853-6773
Fax (713) 853-5313
klay@enron.com

Dear Spencer:

In my capacity as Vice Chairman of the Business Council, I am writing to invite you to address the morning session of our winter meeting at the Park Hyatt Hotel in Washington, DC on February 22, 2001. If you are able to join us, which we very much hope you are, we will work with your staff to determine the most convenient time for you to speak. We envisage about a 20-minute speech with 10 to 15 minutes with our members.

The Council, formed in 1933, is a voluntary association of America's top 100 or so business leaders dedicated to service in the national interest. As a gathering of current and former Chief Executive Officers from virtually every major industry, the Council is entirely an educational and deliberative forum. The Council does not take positions as an organization; instead, it provides a forum for exchange between the leaders of the US business and government communities in an effort to achieve greater understanding and consensus on the important issues facing our country.

Our winter meeting is held in Washington, DC in order to facilitate broad participation by our nation's top political leaders including the President, Cabinet officers and Congressional majority and minority leaders. We would be delighted to have your participation at this winter's event.

Please feel free to call me directly, or have someone on your staff contact Philip Cassidy (Business Council) at 202-298-7650 or Linda Robertson (Enron) at 202-466-9159.

Sincerely,

A handwritten signature in dark ink, appearing to be "Ken", written in a cursive, stylized script.

A

1/22/2001

Kenneth L. Lay
Chairman and Chief Executive Officer
Enron Corporation
POB 1188
Houston, TX 77251-1188

12

Folder Profile

Control # 2001-018407

Name Letter to Spencer Abraham from Kenneth L. Lay, Chairman

Priority Important Critical

Folder Trigger Letter

DOE Addressee

Source PM-O

Spencer Abraham

Date Received 8/6/01

Subject Text

Correspondence Date 7/31/01

Kenneth Lay, Enron, invites Secretary Abraham as keynote speaker at the event, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis," Washington, D.C.

RIDS Information Head of Agency

Action Office # Regular

Sensitivity Not Applicable

Signature/Approval

Classification None

NA

Point of Contact SEISERP

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Johnston

Special Instructions

Date Due

Info copy: ES/Carpenter. Duplicate of 2001-018083. S-1 Regret 10/29/01

Date Completed 8/6/01

14

2001-018407 8/6/01 11:03

018407



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
kenneth.lay@enron.com

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
Forrestal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary:

I'd like to follow up with you personally on a recent invitation extended by Jeff Skilling for an event Enron is hosting, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis;" in Washington, DC on October 3-4. We would be honored to have you as a featured keynote speaker to communicate your vision of America's energy future. The energy industry is at a critical juncture. Through this event, Enron is committed to creating an open dialogue for the industry to work together collectively and constructively to find solutions and discuss ways to get them implemented.

Your involvement in this industry forum represents an opportunity to engage with the most senior level stakeholders in our sector--key opinion leaders, policymakers, regulators, and business executives. This forum resonates with the industry. Our efforts thus far have generated a positive response, and we anticipate a productive and insightful discussion.

I'd appreciate your being part of this forum. Your participation would greatly enhance the prospects of a positive outcome.

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth L. Lay", with a stylized flourish at the end.

Namelist - 8/6/01

Kenneth L. Lay
Chairman of the Board
Enron Corp.
POB 1188
Houston, TX 77251-1188

B

Folder Profile

Control # 2001-018083

Name Letter to Secretary Spencer Abraham from Kenneth Lay, E

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-O

Spencer Abraham

Date Received 8/1/01

Subject Text

Correspondence Date 7/31/01

Kenneth Lay, Enron Corp., invites Secretary Abraham as keynote speaker at "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis", Washington, D.C., 10/3/01 to 10/4/01

RIDS Information Head of Agency

Action Office # Regular

Sensitivity Not Applicable

Signature/Approval

Classification None

NA

Point of Contact SEISERP

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Johnston

Special Instructions

Date Due

Info copy: ES/Carpenter. S-1 Regret
10/29/01

Date Completed 8/2/01

018083



2001-018083 8/1 P 12:07

Facsimile Cover Sheet

To: The Honorable Spencer Abraham
Company: U. S. Department of Energy
Phone: 202-586-6210
Fax: 202-586-4403

From: Kenneth Lay
Company: Office of the Chairman
Phone: 713/853-6773
Fax: 713/853-9479

Date: August 1, 2001

**Pages including
this cover page:** 2

Comments:

A



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
kenneth.lay@enron.com

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
Federal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary:

I'd like to follow up with you personally on a recent invitation extended by Jeff Skilling for an event Enron is hosting, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis," in Washington, DC on October 3-4. We would be honored to have you as a featured keynote speaker to communicate your vision of America's energy future. The energy industry is at a critical juncture. Through this event, Enron is committed to creating an open dialogue for the industry to work together collectively and constructively to find solutions and discuss ways to get them implemented.

Your involvement in this industry forum represents an opportunity to engage with the most senior level stakeholders in our sector—key opinion leaders, policymakers, regulators, and business executives. This forum resonates with the industry. Our efforts thus far have generated a positive response, and we anticipate a productive and insightful discussion.

I'd appreciate your being part of this forum. Your participation would greatly enhance the prospects of a positive outcome.

Sincerely,

A handwritten signature in dark ink, appearing to read "Kenneth L. Lay". The signature is fluid and cursive, with a long, sweeping underline.

13

Namelist - 8/1/001

Kenneth Lay
Chairman of the Board
Enron Corporation
POB 1188
Houston, TX 77251-1188

Q

Folder Profile

Control # 2001-016864 Name Letter to Secretary Spencer Abraham from Jeffrey Skilling

Priority Important Critical

Folder Trigger Letter

DOE Addressee

Spencer Abraham

Source PM-O

Date Received 7/13/01

Subject Text

Jeffrey K. Skilling, Enron Corp., invites Secretary Abraham as featured commentator at the "U.S. Energy Policy at a Crossroads..." forum, Ritz Carlton, Pentagon City, 10/3/01, 7pm-9pm

Correspondence Date 7/12/01

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Regular

Classification None

Signature/Approval

NA

Point of Contact SEISERP

Organization ID EXECCORR2

Action Requested

Appropriate Action

Assigned To

SL/Johnston

Special Instructions

Info copy: ES/Carpenter. S-1 Regret
10/29/01

Date Due

Date Completed 7/13/01

2001-016864 7/13 A 11:24

216864



Jeffrey K. Skilling
President & Chief Executive Officer

Enron Corp.
1400 Smith Street
Houston, TX 77002-7361

P. O. Box 1188
Houston, TX 77251-1188
713-853-6894
Fax 713-646-8381
jeff.skilling@enron.com

July 12, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
Forrestal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary,

It's clear to me that the time for a rational discussion on this country's energy policy is long overdue. That's why I'm writing to invite you to participate as a guest commentator at an energy scenarios forum this fall. This event will only yield solutions if we have true representation of the diverse range of opinions on this complex subject. It's time we come together to create a dialogue around the future of the U.S. energy environment and the recent events in California – no matter how much our opinions differ. I think you'll agree that we don't need any more empty rhetoric. We need solutions.

The forum, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis," will be held at The Ritz-Carlton just outside of Washington, DC on October 3-4, 2001.* We want to bring together some of the country's leading thinkers and stakeholders to actively explore the real scenarios that affect us all. While certain members of the press are invited, the discussions on October 4 will be entirely off the record.

Don't expect a traditional meeting. Enron has engaged a third party global information solutions firm—Intellibridge Corporation—which uses simulation techniques at conferences all over the world. We will use them to explore the impact of energy supply, markets and regulatory policies.

That's where you come in. Given your high profile in advocating the new Bush energy plan as well your well-known ability to assimilate a range of perspectives, I would be honored if you would add your point of view as a featured commentator for the Differing Visions of America's Energy Future, from 7:00 - 9:00 p.m. on Wednesday, October 3. These are moderated discussions in which guest commentators are called upon to speak multiple times and invited to participate throughout the entire program. Please note that the preliminary program agenda is attached and includes names of a number of commentators who have not yet confirmed.

I very much hope you'll join us for this important event. Please call (202) 298-7946 if you have any questions. We'll be in touch with your office in the next few days to discuss your participation.

Sincerely,

A handwritten signature in dark ink, appearing to read "Jeff K. Skilling". The signature is written in a cursive, flowing style.

Folder Profile

Control # 2001-004148 Name Invitation to Secretary Abraham from Ken Lay, Chairman (

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-O

Spencer Abraham

Date Received 2/12/01

Subject Text

Correspondence Date 2/12/01

Mr. Ken Lay, Chairman of Enron invites Secretary Abraham to a retirement reception in Washington, D.C. on February 22, 2001 (6:00 - 8:00 p.m.), honoring Joe Hillings for his 18 years of Service

RIDS Information Head of Agency

Sensitivity Not Applicable

Action Office # Social

Classification None

Signature/Approval

Point of Contact CARPENTC

NA

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

SL/Kohs

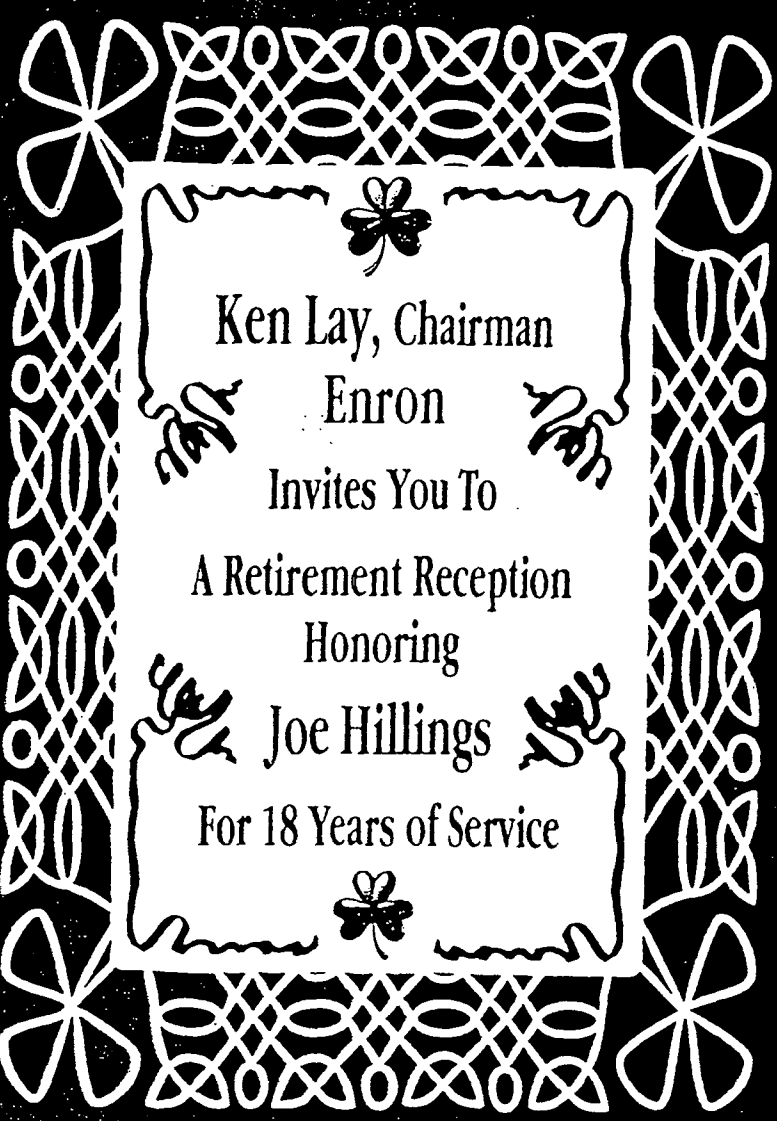
Special Instructions

Date Due

Please RSVP. Information copy:
SL/Johnston

Date Completed 2/13/01

17



Ken Lay, Chairman
Enron

Invites You To

A Retirement Reception
Honoring

Joe Hillings

For 18 Years of Service

2001-004148 Feb 12 p 1:24

A.

Namelist (2001-004148)

February 12, 2001

Mr. Ken Lay

Chairman

Enron

1775 Eye Street, N.W. (Suite 800)

Washington, D.C. 20006

2001-005425 2/27 P 3:45

005425



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
kenneth.lay@enron.com

February 27, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Dear Secretary Abraham:

On behalf of the Business Council I want to express our sincere appreciation for your attendance and participation at our meeting in Washington, DC.

Your remarks struck a real chord with our members and provided us with insightful observations about the new administration's priorities.

Thank you for fitting us into your busy schedule. Very best wishes for success to you and your fellow colleagues.

Sincerely,

A handwritten signature in cursive script that reads "Ken".

A

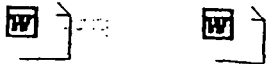
Namelist: 2/27/01

Kenneth L. Lay
Chairman of the Board
Enron Corporation
Post Office Box 1188
Houston, TX 77251-1188

13

Hudome, Randa

From: Hardy Jr, John [John.Hardy@enron.com]
Sent: Monday, October 22, 2001 4:15 PM
To: Pumphrey, David; Hudome, Randa
Subject: ENRON'S JOSE LNG PROJECT



JH-JOSE LNG-2.doc JH-JOSE LNG-1.doc

David/Randa,

Attached is some additional information regarding arguments for countering the Venezuela position on Jose LNG. Please review and I would be happy to discuss if that would be helpful.

John Hardy
(202) 466-9156

<<JH-JOSE LNG-2.doc>> <<JH-JOSE LNG-1.doc>>

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D	Subject	Location	Start	End	Recurrence	Categ...	In Folder
	Meeting with John Hardy Enron		Tue 5/29/2001...	Tue 5/29/2001...	(none)		Calendar
	John Hardy with ENRON "Discu...		Mon 9/10/200...	Mon 9/10/200...	(none)		Calendar
	Helen Rizzo (202) 466-9151 <end>						

26

Tuesday

June 2001

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
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27	28	29	30	31		

S	M	T	W	T	F	S
					1	2
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Monday

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30						

S	M	T	W	T	F	S
	1	2	3	4	5	6
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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<div>9⁰⁰</div>	
<div>10⁰⁰</div>	
<div>11⁰⁰</div>	
<div>12^{pm}</div>	
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<div>5⁰⁰</div>	
<div>6⁰⁰</div>	

John Hardy with ENRON "Discuss Venezuela and Domenica Project"

Notes

Folder Profile

Control # 2001-012714

Name Fax to OS/McSarrow from Dave Lugar (Quinn Gillespie &

Priority Important

Folder Trigger Invitation

DOE Addressee

Source PM-O

OS/McSarrow

Date Received 5/22/01

Subject Text

Correspondence Date 5/21/01

David Lugar, Quinn Gillespie & Associates requests meeting for client Enron for May 23, 2001; purpose of meeting to discuss National Energy Policy report & potential legislative activities in Congress

RIDS Information Head of Agency

Action Office #

Sensitivity Not Applicable

Signature/Approval

Classification None

NA

Point of Contact GORHAMO

Organization ID EXECCORR2

Action Requested

Assigned To

Appropriate Action

OS/McSarrow

Special Instructions

Date Due

Other attendees: Rick Shapiro and Linda Robertson. Document controlled after-the-fact. McSarrow received copy 5/22/01.

Date Completed 5/24/01

22

2001-012714 May 22 A 9:56

1133 Connecticut Avenue, N.W.
Fifth Floor
Washington, DC 20036
(202) 457-1110 phone
(202) 457-1130 fax

**QUINN GILLESPIE
& ASSOCIATES LLC**

Fax Transmission

If you experience difficulty receiving this fax transmission please contact the operator at
(202) 457-1110.

To: Kyle McSarrow	From: Dave Lugar
Fax:	Pages: 2 Pages including cover
Phone:	Date: 5/21/01
Re:	CC:

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply

*Shenks
For the System
I gave Kyle a copy
Jm*

Confidential

Information intended only for the use of the addressee named above. If the reader of this message is not the intended recipient or the employee or agent responsible for delivering the message to the intended recipient, please note that any dissemination, distribution or copying of this communication is strictly prohibited. Anyone who receives this communication in error should notify us immediately by telephone and return the original message to us at the above address via U.S. Mail.

1

Quinn Gillespie
& Associates L.L.C.

May 21, 2001

Mr. Kyle McSarrow
Chief of Staff
United States Department of Energy
Washington, DC

Kyle,

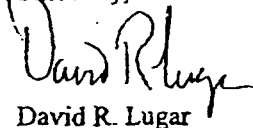
I would like to request a meeting for our client Enron and you for this Wednesday, May 23, 2001. The purpose of the meeting is to discuss the President's National Energy Policy report and potential legislative activities in Congress.

In addition to myself, Rick Shapiro, Senior Vice President of Government Affairs, Houston and Linda Robertson, Vice President of Government Affairs, Washington, will be attending the meeting.

I will follow up with your assistant later today to see if a meeting is possible for Wednesday. In the interim, please feel free to contact me on 202-457-1110 if you should have any questions.

Thank you in advance for your consideration of this request.

Sincerely,



David R. Lugar

12

EXHAUSTIVE SINGLE ITEMS REPORT

Folder Profile data for 2001-012714

profile.docname Fax to OS/McSarrow from Dave Lugar (Quinn Gillespie & Associates LLC)
Name

profile.abstract David Lugar, Quinn Gillespie & Associates requests meeting for client Enron for
- May 23, 2001; purpose of meeting to discuss National Ener
Subject Text

<u>profile.creation_date</u>	Date Created	5/22/2001	<u>ldoeorg(addressesee).doeorg</u> DOE
Addressee	OS/McSarrow		
<u>profile.control</u>	Control #	2001-012714	<u>ldoeorg.description</u>
<u>profile.date_completed</u>	Date Completed	5/24/2001	
<u>profile.date_con</u>	Correspondence Date	5/21/2001	<u>ldoeorg(assign_to).doeorg</u>
Assigned To	OS/McSarrow		
<u>profile.date_due</u>	Date Due		<u>ldoeorg.description</u>
<u>profile.progoff_num</u>	Action Office #		
<u>people.fullname</u>	Point of Contact	Gorham, Octavia	<u>ldoeorg(signature).doeorg</u>
Signature/Approval	NA		
<u>laction.action</u>	Action Requested	Appropriate Action	<u>ldoeorg.description</u>
<u>levent.jobevent</u>	<u>lpriority.priority</u>	Folder Trigger	Priority Invitation Important
<u>lsensitivity.sensitivity</u>	Sensitivity	Not Applicable	<u>lsource.source</u> Source
<u>lclassif.classif</u>	Classification	None	<u>lsource.description</u>
<u>lclassif.description</u>		None	
<u>lrids.rids</u>	RIDS Information	Head of Agency	<u>ltopic.topic</u> Topical
Index			
<u>lrids.description</u>	Executive Correspondence materials	<u>ltopic.description</u>	

profile.instructions Special Instructions Other attendees: Rick Shapiro and Linda Robertson. Document
controlled after-the-fact. McSarrow received copy 5/22/01.

Folder Components:

Component Name
Component Type

1. Fax to OS/McSarrow from Dave Lugar (Quinn Gillespie & Associates LLC)

Job Folder

2. incoming-Lugar

Incoming Image

3. Namelist-Lugar

List of Addressees - WP File Only

Route Name: 2001-012714

Gorham, Octavia

Active Tasks

Dispatch Task Received by _ES Dispatch on Thursday May 24 2001 at 10:52

Completed Tasks

Dispatch Task received by _ES Dispatch on Thursday May 24 2001 at 10:52

Comments Entries:

C

Namelist-May 24, 2001

Mr. David R. Lugar
Quinn Gillespie and Associates L.L.C.
1133 Connecticut Avenue, NW
Fifth Floor
Washington, DC 20036

D



The Deputy Secretary of Energy
Washington, DC 20585

FINAL

SCHEDULE FOR FRANCIS BLAKE
Wednesday, September 19, 2001

7:30 AM EOC BRIEFING

8:00 AM

8:00 AM UPDATED: MANAGEMENT STRATEGY MEETING

8:30 AM Blake, Card, Carnes, Gordon and McSarrow

9:00 AM ROUTINE WEEKLY EIA STAFF MTG.

9:30 AM

10:00 AM PROGRAM DIRECTOR'S MTG.-(S-1 CONF. RM.)

10:30 AM

11:00 AM PROJECT MGMT. MEETING

11:30 AM Carnes/Edwards

1:00 PM FUEL CELL MTG.

1:30 PM contact: Randi

2:00 PM HEARING PREP

3:00 PM

4:00 PM ENRON CORPORATION

4:30 PM Mark Frevert, Vice Chairman; Steve Kean, EA & Vice President;
Linda Robertson

4:30 PM WAYNE LEISS

5:00 PM

5:00 PM USEC

5:30 PM kyle/Bob Card/Kevin Kolevar

5:45 PM CONFERENCE CALL W/ CHAIRMAN WOOD OF FERC

6:15 PM Mr. Wood will call in
Edison Electric Inst.

24



Linda L. Robertson
Vice President
Federal Government Affairs

Enron
1775 Eye Street, NW, Suite 800
Washington, DC 20006
202-466-9159
Fax 202-828-3372
linda.robertson@enron.com

VIA FAX
202-586-7210 (fax)

September 7, 2001

The Honorable Francis Blake
Deputy Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Room 7B
Washington, DC 20585

Dear Secretary Blake:

Mark Frevert, Vice Chairman, Enron would like to schedule a meeting with you to discuss the state of electricity competition. Mr. Frevert is available for a meeting in Washington, DC from September 19 through September 20, 2001.

At your convenience, please call me at 202-466-9159. I look forward to talking with you.

Sincerely,

Linda Robertson

*met on
9/19/2001
4-4:30PM*

OK

Folder Profile	
Control # 2001-001530	Name Letter to Secretary Spencer Abraham from Kenneth L. Lay
Priority Important Critical	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Invites Secretary Abraham to address the morning session of the winter meeting at the Park Hyatt Hotel – February 22, 2001	Date Received 1/23/01
Action Office # Regular	Correspondence Date 1/22/01
Signature/Approval NA	RIDS Information Head of Agency
Action Requested Appropriate Action	Sensitivity Not Applicable
Special Instructions Info:ES/Carpenter	Classification None
	Point of Contact ALSTONL
	Organization ID EXECCORR2
	Assigned To SL/Johnston
	Date Due
	Date Completed 1/23/01

release

26

17

2001-001530 Jan 23 A7:28



Kenneth L. Lay
*Chairman and
Chief Executive Officer*

Enron Corp.
P. O. Box 1188
Houston, TX 77251-1188
(713) 853-6773
Fax (713) 853-5313
klay@enron.com

January 22, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Dear Spencer:

In my capacity as Vice Chairman of the Business Council, I am writing to invite you to address the morning session of our winter meeting at the Park Hyatt Hotel in Washington, DC on February 22, 2001. If you are able to join us, which we very much hope you are, we will work with your staff to determine the most convenient time for you to speak. We envisage about a 20-minute speech with 10 to 15 minutes with our members.

The Council, formed in 1933, is a voluntary association of America's top 100 or so business leaders dedicated to service in the national interest. As a gathering of current and former Chief Executive Officers from virtually every major industry, the Council is entirely an educational and deliberative forum. The Council does not take positions as an organization; instead, it provides a forum for exchange between the leaders of the US business and government communities in an effort to achieve greater understanding and consensus on the important issues facing our country.

Our winter meeting is held in Washington, DC in order to facilitate broad participation by our nation's top political leaders including the President, Cabinet officers and Congressional majority and minority leaders. We would be delighted to have your participation at this winter's event.

Please feel free to call me directly, or have someone on your staff contact Philip Cassidy (Business Council) at 202-298-7650 or Linda Robertson (Enron) at 202-466-9159.

Sincerely,

A handwritten signature in dark ink, appearing to read "Ken", written over a horizontal line.

Folder Profile	
Control # 2001-001758	Name Invitation to Secretary Spencer Abraham from Kenneth Lay
Priority Important	Folder Trigger Invitation
DOE Addressee Spencer Abraham	Source PM-I
Subject Text Mr. Kenneth Lay of Enron Business Council invites Secretary Abraham to address the morning session of the winter meeting on February 22, 2001, in Washington, DC	Date Received 1/24/01
Action Office # Regular	Correspondence Date 1/22/01
Signature/Approval NA	RIDS Information Head of Agency
Action Requested Appropriate Action	Sensitivity Not Applicable
Special Instructions Info copy: ES/Carpenter	Classification None
	Point of Contact HOLLOWAG
	Organization ID EXECCORR2
	Assigned To SL/Johnston
	Date Due
	Date Completed 1/24/01

01/24/01 11:17 FAX
01/24/01 11:02 FAX

JAN 24 2001 09:36 FR ENRON

TO 5867644

P.01/01

2001-001758 1/24 A 11:50



January 22, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Kenneth L. Lay
Chairman and
Chief Executive Officer

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
(713) 853-6773
Fax (713) 853-9323
klay@enron.com

Dear Spencer:

In my capacity as Vice Chairman of the Business Council, I am writing to invite you to address the morning session of our winter meeting at the Park Hyatt Hotel in Washington, DC on February 22, 2001. If you are able to join us, which we very much hope you are, we will work with your staff to determine the most convenient time for you to speak. We envisage about a 20-minute speech with 10 to 15 minutes with our members.

The Council, formed in 1933, is a voluntary association of America's top 100 or so business leaders dedicated to service in the national interest. As a gathering of current and former Chief Executive Officers from virtually every major industry, the Council is entirely an educational and deliberative forum. The Council does not take positions as an organization; instead, it provides a forum for exchange between the leaders of the US business and government communities in an effort to achieve greater understanding and consensus on the important issues facing our country.

Our winter meeting is held in Washington, DC in order to facilitate broad participation by our nation's top political leaders including the President, Cabinet officers and Congressional majority and minority leaders. We would be delighted to have your participation at this winter's event.

Please feel free to call me directly, or have someone on your staff contact Philip Cassidy (Business Council) at 202-298-7650 or Linda Robertson (Enron) at 202-466-9159.

Sincerely,

Ken

Post-It® Fax Note	7671	Date	1/24	# of pages	1
To	Schedule	From	Ken Lay		
On/Dept.		Co.	ENRON		
Phone #		Phone #			
Fax #	586-7644	Fax #			

Natural gas. Electricity. Endless possibilities.™

** TOTAL PAGE. 01 **

A

Folder Profile	
Control # 2001-005244	Name Outgoing letters from Secretary Abraham to Philip Cassidy
Priority Essential	Folder Trigger Request by Secretary
DOE Addressee Spencer Abraham	Source OL
Subject Text thank you letters afte attending the Business Council's forum of business leaders	Date Received 2/26/01
Action Office #	Correspondence Date 2/26/01
Signature/Approval Spencer Abraham	RIDS Information Head of Agency
Action Requested Approval/Signature	Sensitivity Not Applicable
Special Instructions	Classification None
	Point of Contact WIARDS
	Organization ID EXECCORR2
	Assigned To ME-70
	Date Due
	Date Completed 2/28/01



THE SECRETARY OF ENERGY
WASHINGTON, D.C. 20585

2001-005244

February 28, 2001

Mr. Kenneth L. Lay
Chairman and CEO
Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188

Dear Ken:

I was pleased to attend and speak at the Business Council's forum of business leaders. I appreciated the opportunity to address this important group.

You did a great job as Master of Ceremonies, and thank you for your kind words of introduction.

With best wishes.

Sincerely,

A handwritten signature in black ink that reads "Spencer Abraham".

Spencer Abraham



Printed with soy ink on recycled paper

A



Department of Energy
Office of the Secretary

Autopen Authorization

Date: _____

ES Number: 005244

Letter ☒

Memo ☐

Certificate ☐

Directive ☐

Other ☐ (please specify) _____

Signature Requested:

Spencer Abraham ☒

Spence ☐

S.A. ☐

Authorizing Official's Signature: _____

Majida Sanchez

Remarks:

Ken Lay
Philip Cassidy

Folder Profile	
Control # 2001-005425	Name Letter to Secretary Spencer Abraham from Kenneth Lay, E
Priority Important	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Kenneth Lay, Enron Corporation, on behalf of the Business Council, expresses appreciation to Secretary Abraham for attending and participating at their meeting in Washington, DC	Date Received 2/27/01
Action Office #	Correspondence Date 2/27/01
Signature/Approval NA	RIDS Information Head of Agency
Action Requested Appropriate Action	Sensitivity Not Applicable
Special Instructions	Classification None
	Point of Contact GREENA
	Organization ID EXECCORR2
	Assigned To Spencer Abraham
	Date Due
	Date Completed 2/28/01

release

2001-005425 2/27 P 3:45

005425



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
kenneth.lay@enron.com

February 27, 2001

The Honorable Spencer Abraham
Secretary
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Dear Secretary Abraham:

On behalf of the Business Council I want to express our sincere appreciation for your attendance and participation at our meeting in Washington, DC.

Your remarks struck a real chord with our members and provided us with insightful observations about the new administration's priorities.

Thank you for fitting us into your busy schedule. Very best wishes for success to you and your fellow colleagues.

Sincerely,

A handwritten signature in black ink, appearing to read "Ken", written in a cursive style.

Folder Profile	
Control # 2001-009085	Name Fax to OS/Dandy from Linda Robertson, ENRON
Priority Important	Folder Trigger Invitation
DOE Addressee OS/Dandy	Source PM-O
	Date Received 4/3/01
Subject Text Linda Robertson, ENRON, requests a meeting for Dr. Lay with Secretary Abraham on 4/4/01 at 4:30 pm (no location provided)	Correspondence Date 4/3/01
	RIDS Information Head of Agency
Action Office # Regular	Sensitivity Not Applicable
Signature/Approval NA	Classification None
	Point of Contact GREENA
	Organization ID EXECCORR2
Action Requested Appropriate Action	Assigned To SL/Johanson
Special Instructions Received after the fact in ES on 4/4/01 pm - Regret	Date Due
	Date Completed 4/5/01

release

APR 03 2001 11:16 FR ENRON

TO 5867573

P.01/01

2001-009085 Apr 3 p 12:15

ENRON, WASHINGTON
1775 EYE STREET, NW
Suite 800
Washington, DC 20006
202-466-8146
202-828-3372 (fax)

FAX COVER SHEET

DATE: 4/3/01 11:30 AM
NAME: fax number:
TO:

Ms. Majida Dandy
Senior Advisor to the Secretary
The Honorable Spencer Abraham
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585
202-586-6210
202-586-7844 (fax); (for quick faxing!)
202-586-4403 (fax)
Direct fax for 202-886-7573 (fax)

FROM: Linda Robertson, Vice President, Federal Government Affairs
Lora Sullivan
PHONE: 202-466-8142
FAX: 202-828-3372

Number of pages: 1

Re: Request for meeting with Secretary Abraham on Friday, April 6, 2001

Dear Ms. Dandy:

Thank you for your faxed letter of March 30 advising Secretary Abraham is not available on April 5th. Dr. Lay is also available at 4:30 PM on Thursday, April 4th. Is there any possibility of scheduling a meeting with the Secretary at this time?

Linda Robertson
202-466-8169 (phone)
202-828-3372 (fax)

A.

Folder Profile	
Control # 2001-009704	Name Letter to Secretary Spencer Abraham from Kenneth Lay, Er
Priority Important	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Recommends Jan Mares for a leadership position in DOE, particularly as Assistant Secretary for Fossil Energy	Date Received 4/9/2001
Action Office # Employment	Correspondence Date 3/30/2001
Signature/Approval Spencer Abraham	RIDS Information Head of Agency
Action Requested Prepare Response	Sensitivity NA
Special Instructions	Classification None
	Point of Contact SEISERP
	Organization ID EXECCORR2
	Assigned To ME-70
	Date Due
	Date Completed 4/27/2001
	Status COMPLETED

2001-009704 4/9 P 5:13

009704



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P. O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
Kenneth.Lay@enron.com

March 30, 2001

Mr. Spencer Abraham
Secretary of Energy
1000 Independence Ave, SW Room 7A-257
Washington, DC 20585

Dear Spence:

Not surprising, you have certainly hit the ground running. It appears that you are getting an excellent grasp of all the energy issues and the various alternatives to devising a comprehensive energy policy for our country.

A long term friend of mine, Jan Mares, has expressed an interest in one of the leadership positions in the Department of Energy. He served in that department during the prior Bush administration and did an excellent job. He would be particularly interested in the Assistant Secretary for Fossil Energy position. But I also think he would be quite willing to take any significant leadership position in the department.

I believe you would find Jan very intelligent, extremely well qualified and a person who could do an excellent job. If there is any additional information I can provide, please let me know.

Sincerely,

A handwritten signature in dark ink, appearing to be "Ken", written in a cursive, slanted style.

Endless possibilities.™

19

2001-009704



The Secretary of Energy
Washington, DC 20585

April 27, 2001

Mr. Kenneth L. Lay
Chairman of the Board
Enron Corp.
P.O. Box 1188
Houston, Texas 77251-1188

Dear Ken:

Thank you for recommending Mr. Jan Mares for employment at the United States Department of Energy. I appreciate his interest in the Department.

Over the past several months, the Department has received a great number of recommendations for employment and resumes, which we are forwarding to the White House Office of Personnel for review. All of the recommendations and resumes will be reviewed thoroughly before hiring decisions are made.

Thank you again for forwarding this information and for your interest in the Department of Energy.

Sincerely,

A handwritten signature in black ink, which appears to read "Spencer", is written over the typed name.

Spencer Abraham

Thanks!



Printed on recycled paper

100

Folder Profile	
Control # 2001-015700	Name E-Mail address to Secretary Abraham from Merrill Barlow
Priority Routine	Folder Trigger E-Mail Message
DOE Addressee Spencer Abraham	Source PM-I
Subject Text Solutions to the gasoline crisis	Date Received 7/3/01
	Correspondence Date 6/21/01
	RIDS Information Head of Agency
	Sensitivity Not Applicable
Action Office #	Classification None
Signature/Approval PO	Point of Contact PRYORR
	Organization ID EXECCORR2
Action Requested Prepare Response	Assigned To PO
Special Instructions	Date Due 9/11/01
	Date Completed

2001-015700 7/3 A 10:51

Secretary, The

From: merrill.barlow@ENRON.COM%internet [merrill.barlow@ENRON.COM]
Sent: Thursday, June 21, 2001 10:16 AM
To: Secretary, The
Subject: Policy

015700

21 JUN -3 A 10:51

FROM: merrill.barlow@enron.com
NAME: Merrill Barlow
SUBJECT: Policy
ZIP: 77002
CITY: Houston
PARM.1: TO:the.secretary@hq.doe.gov
STATE: TX
TOPIC: Gasoline
SUBMIT: Send Comments
CONTACT: email
COUNTRY: USA

MESSAGE: I was thinking about the varied regulations around the country for gasoline blending to meet environmental standards and would like to make a recommendation. Establish a national standard for a reformed gasoline to end market fragmentation across the country. By offering different blends in non-attainment areas makes any supply disruption more severe in the region and tends to increase the price differential between, say, Omaha and LA. It would be logical to conclude, on a fundamental basis, that increasing the liquidity of the overall gasoline market would offset the additional cost incurred by national RFG production while improving environmental quality. I look forward to your reply.

MAILADDR: (b)(6)

Folder Profile	
Control # 2001-016864	Name Letter to Secretary Spencer Abraham from Jeffrey Skilling,
Priority Important Critical	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Jeffrey K. Skilling, Enron Corp., invites Secretary Abraham as featured commentator at the "U.S. Energy Policy at a Crossroads..." forum, Ritz Carlton, Pentagon City, 10/3/01, 7pm-9pm	Date Received 7/13/01
Action Office # Regular	Correspondence Date 7/12/01
Signature/Approval NA	RIDS Information Head of Agency
Action Requested Appropriate Action	Sensitivity Not Applicable
Special Instructions Info copy: ES/Carpenter. S-1 Regret 10/29/01	Classification None
	Point of Contact SEISERP
	Organization ID EXECCORR2
	Assigned To SL/Johnston
	Date Due
	Date Completed 7/13/01

2001-016864 7/13 A 11:24

216864



Jeffrey K. Skilling
President & Chief Executive Officer

Enron Corp.
1400 Smith Street
Houston, TX 77002-7361

P. O. Box 1188
Houston, TX 77251-1188
713-853-6894
Fax 713-646-8381
jeff.skilling@enron.com

July 12, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
Forrestal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary,

It's clear to me that the time for a rational discussion on this country's energy policy is long overdue. That's why I'm writing to invite you to participate as a guest commentator at an energy scenarios forum this fall. This event will only yield solutions if we have true representation of the diverse range of opinions on this complex subject. It's time we come together to create a dialogue around the future of the U.S. energy environment and the recent events in California - no matter how much our opinions differ. I think you'll agree that we don't need any more empty rhetoric. We need solutions.

The forum, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis," will be held at The Ritz-Carlton just outside of Washington, DC on October 3-4, 2001. We want to bring together some of the country's leading thinkers and stakeholders to actively explore the real scenarios that affect us all. While certain members of the press are invited, the discussions on October 4 will be entirely off the record.

Don't expect a traditional meeting. Enron has engaged a third party global information solutions firm—Intellibridge Corporation—which uses simulation techniques at conferences all over the world. We will use them to explore the impact of energy supply, markets and regulatory policies.

That's where you come in. Given your high profile in advocating the new Bush energy plan as well your well-known ability to assimilate a range of perspectives, I would be honored if you would add your point of view as a featured commentator for the Differing Visions of America's Energy Future, from 7:00 - 9:00 p.m. on Wednesday, October 3. These are moderated discussions in which guest commentators are called upon to speak multiple times and invited to participate throughout the entire program. Please note that the preliminary program agenda is attached and includes names of a number of commentators who have not yet confirmed.

I very much hope you'll join us for this important event. Please call (202) 298-7946 if you have any questions. We'll be in touch with your office in the next few days to discuss your participation.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff K. Skilling".

A.

U.S. ENERGY POLICY AT A CROSSROAD: ALTERNATIVE FUTURES FOR THE CURRENT "ENERGY CRISIS"

PRESENTED BY ENRON IN PARTNERSHIP WITH INTELLIBRIDGE CORPORATION

**October 3-4, 2001
The Ritz-Carlton Hotel, Pentagon City, Arlington, VA**

WEDNESDAY, OCTOBER 3

5:30-7:00 p.m. Cocktail Reception and Registration for Delegates

7:00-9:00 p.m. "Differing Visions of America's Energy Future"

A keynote address followed by a dinner conversation with a panel of leading policy makers:

- Richard B. Cheney, Vice President of the United States
- Spencer Abraham, Secretary, Department of Energy
- Jeffrey K. Skilling, President & CEO, Enron Corp.
- Bill Richardson, Former Secretary, Department of Energy
- Gray Davis, Governor, California
- Dianne Feinstein, California, Committee on Energy and Natural Resources

THURSDAY, OCTOBER 4

7:30-8:30 a.m. Continental Breakfast and Registration for Delegates

PLEASE NOTE: OPENING AND CONCLUDING PLENARY SESSIONS WILL BE OPEN TO THE GENERAL PRESS. IN THE INTEREST OF CANDOR, ALL OTHER SESSIONS WILL BE OFF THE RECORD WITH PRESS PARTICIPATION BY INVITATION ONLY.

8:30-9:30 a.m. Opening Plenary Session: "Markets vs. Regulation: Finding the Proper Mix"

Featured Remarks: Pat Wood, Commissioner, FERC

9:45-11:45 a.m. Scenario Session I

Scenario A - The Crisis is Contained. Anticipating the Next Challenge: Under this first scenario, natural gas and electricity prices continue to subside. Public concern fades as energy prices gradually decline. The crisis remains contained to California. Hydro conditions improve during Winter 2001, and other western states are able to manage any emerging supply problems. Potential trouble states in other regions, like New York, manage to install enough capacity and alleviate

transmission constraints, both in gas and electricity. Efforts to mitigate the energy crisis overachieve in some regions. The nation's energy supply mix shifts slightly in response to policy changes.

Scenario B - Crisis Worsens, Spreads to Other States: Efforts to mitigate California's electricity crisis prove insufficient, or even exacerbate the problem. Shortages worsen in the Pacific Northwest, and Desert Southwest, pinching import-dependent California even further. Neighboring states refuse to export to California. Other resource supply shortages emerge as well: Natural gas prices surge, sharing of water resources between California and the Pacific Northwest become a serious point of contention. California quickly burns through the money raised by its bond issue, and the state finds itself in severe financial trouble. Federal and state authorities respond to perceived infrastructure shortages by relaxing right-of-way and environmental regulations. States in other regions also suffer supply shortages during the summers. Trends toward deregulation are halted in various states, reversed in others.

Featured Commentators

- Paul J. Joskow, Director, Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology
- Robert Hahn, Director, AEI-Brookings Joint Center for Regulatory Studies
- Linda Breathitt, Commissioner, FERC
- Jeff Bingaman, New Mexico, Chairman, Committee on Energy and Natural Resources
- Brian Malnak, Staff Director, Senate Committee on Energy and Natural Resources

12:00-2:00 p.m.

Luncheon Roundtable "Virtual Energy Markets: A Look Ahead"

This luncheon discussion will focus on the challenge ahead for the energy industry itself. To what extent will "virtual" energy contracts overcome physical imbalances? Is there a trend toward "financialization" of the energy industry? What mitigating role might risk management instruments have played in California's energy crisis? Could they help avert possible future crises elsewhere?

Opening Remarks: Jeffrey K. Skilling, President & CEO, Enron Corp.

Featured Commentators

- James Newsome, Acting Chairman, Commodities Futures Trading Commission
- Lawrence Eagles, Director of Research, GNI, Ltd.
- Kit Konolige, Managing Director, Morgan Stanley Dean Witter, New York
- Vito Stagliano, Policy Advisor, Electric Sector Restructuring and Regional Transmission Organizations (RTOs) in association with Arthur Andersen LLP
- Vijay Vaitheeswaran, Energy and Environment Reporter, *The Economist*

2:15-4:15 p.m.

Scenario Session II

"Political Aftershocks and Regulatory Responses"

Scenario A – More government, less markets: Under this first scenario, regulators react to the energy crisis by taking a more active role in state electricity markets. As other states experience their own, or inherit California's, electricity shortages, public opinion calls for price caps, not just mitigation, and at least some regulators respond. Congress drafts comprehensive energy legislation extending powers of a number of federal agencies to facilitate the building of infrastructure.

Scenario B – More markets, less government: Price mitigation measures are removed after a time in California, and other states (like New York) considering such measures drop their plans. Customers either benefit from lower prices, or at last come to grips with realities of a deregulated power sector, finding other ways (fixed price contracts, load curtailment programs, installing their own energy sources) of protecting themselves from price spikes. Comprehensive energy legislation fails to emerge or serves to ease restrictions on infrastructure development.

Featured Commentators

- Lawrence Makovich, Senior Director, Cambridge Energy Research Associates (CERA)
- John Tuck, Former Deputy Energy Secretary, Of Counsel, Baker Donelson
- Fiona Woolf, Director Utilities Practice, CMS Cameron McKenna
- Glenn Lovin, Director, Power Marketing Association
- Keith Stuart Richman, State Assemblyman, 38th District, California
- John D. Dingell, Michigan, Ranking Member, Committee on Energy and Commerce

4:30-6:00 p.m.

Cocktail Reception and Concluding Plenary Session "Lessons from Elsewhere and Arriving at Consensus"

How have other states (or other countries) dealt with, or how do they plan to deal with impending energy shortages? Which represents the best path forward for U.S. state and federal energy policy?"

Opening Remarks: John Hanger, Former Pennsylvania PUC Commissioner

Featured Commentators

- Dennis E. Eyre, Executive Director, Western Systems Coordinating Council
- Larry Ruff, Independent Consultant and Former Senior Vice President, National Economic Research Associates (NERA)
- Robert Littlechild, Director, London Economics Consulting Group, Former UK Director General of Electricity Supply
- Peter Behr, Columnist, *The Washington Post*
- Peter Overby, Correspondent, National Public Radio
- Andrew Cassell, Columnist, *The Philadelphia Inquirer*
- Kathryn Kranhold, Reporter, *The Wall Street Journal*

Includes proposed names of some commentators who have not yet confirmed as of 7/11/01.

Folder Profile	
Control #	2001-017821
Name	Action Memo from FE/Kripowicz to the Secretary
Priority	Important
Folder Trigger	Internal Memo
DOE Addressee	Source
Spencer Abraham	AM
Date Received	8/16/01
Subject Text	Correspondence Date
Invites recommendations of nominees to serve on the National Petroleum Counsel	8/15/01
RIDS Information	Head of Agency
Sensitivity	Not Applicable
Classification	None
Action Office #	FE
Point of Contact	PRYORJ
Organization ID	EXECCORR2
Signature/Approval	Assigned To
Spencer Abraham	FE
Date Due	
Action Requested	Date Completed
Approval/Signature	8/15/01
Special Instructions	
Letters dispatched in FE.	



The Secretary of Energy
Washington, DC 20585

August 15, 2001

Mr. Ken Lay
Chairman
Enron Corp.
1400 Smith Street
Houston, Texas 77002

Dear Ken:

The National Petroleum Council is a Federal advisory committee that advises the Secretary of Energy on matters relating to the oil and gas industry. It has a long and distinguished history of contributing to the energy strength, security, and stability of our Nation. It also has a long and distinguished history of addressing society's shared environmental concerns.

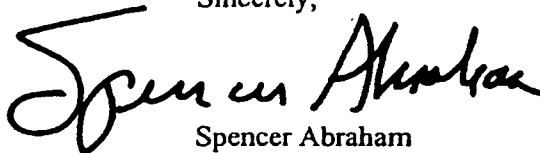
At this time, there are several vacancies on the Council. In addition, the terms of the entire membership -- approximately 175 individuals -- will expire at the end of this year. In filling these vacancies, I would like to attract the most qualified individuals from the broadest possible range of relevant disciplines to serve on the Council.

I know that you have undoubtedly had professional interactions with individuals who would add great value to this important group. I am, therefore, asking that you give some thought to individuals and organizations that you believe might appropriately serve on the National Petroleum Council and recommend them to me for service in the Council's 2002-2003 term.

Since the process of selecting and installing new members is time consuming, it would be a great help if you could provide any names, along with relevant information, if at all possible, by September 14, 2001.

Thank you for your consideration of this important matter.

Sincerely,


Spencer Abraham



Printed on recycled paper

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Folder Profile	
Control # 2001-018057	Name Letter to Secretary Abraham from R.T. "Hap" Boyd, Enron
Priority Important	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Robert Boyd writes Secretary Abraham to request a meeting to give a presentation on wind energy & its potential contribution of clean electricity to the nation's energy mix	Date Received 7/31/01
Action Office # Regular	Correspondence Date 7/31/01
Signature/Approval NA	RIDS Information Head of Agency
	Sensitivity Not Applicable
	Classification None
	Point of Contact CUNNINGD
	Organization ID EXECCORR2
Action Requested Appropriate Action	Assigned To SL/Johnston
Special Instructions	Date Due
	Date Completed 8/3/01

2001-018057 JUL 31 P 3:20



Enron Wind Corp.
444 S. Flower Street
Suite 4545
Los Angeles, CA 90071
Tel: (213) 452-5103
Fax: (213) 452-4888
hap.boyd@enron.com
www.wind.enron.com

TELEFAX

Date: July 31, 2001 Pages including this cover page: 2
To: Secretary Spencer Abraham Fax Number: 202/586-4403
Majida Dandy, Scheduling Director 202/586-7573
From: Robert T. "Hap" Boyd

Please see attached letter. Thank you.

R.T. "Hap" Boyd

L:\DocFax\Classes\RTBFaxTemplate.doc

This telefax is intended only for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this telefax is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone, and return the original transmission to us at the address below via the U.S. Postal Service. Thank you.

A



Enron Wind Corp.

444 South Flower Street, Suite 4545
Los Angeles, CA 90071-2946
(213) 452-4880
Fax (213) 452-4888

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue
Washington, D.C. 20585

Dear Mr. Secretary:

Enron Wind Corp (EWC) is one of the world leaders in the manufacture of wind turbines for utility scale electric generation. EWC has manufacturing facilities in California employing over 400 people and plants in Germany and Spain. Worldwide we employ 1,478 people.

44,500 MW of new wind energy capacity was added throughout the world in 2000 bringing total capacity to 18,449 MW. The U.S. had 2586 MW wind capacity at the end of 2000. Installed world wind capacity is expected to grow at a rate of over 17% per year over the next five years. The U.S. will add 1500 MW in 2001.

Not only is new wind capacity growing at a high rate, but costs are coming down so that wind generated electricity is expected to be cost competitive with fossil generation in three to five years.

I mention these facts to you because I would like to request a meeting to give you a presentation on wind energy and its potential contribution of clean electricity to the nation's energy mix. I think that once you've heard the facts that you will become an enthusiastic supporter of wind technology.

I will follow up on this letter by contracting your scheduler to arrange a meeting.

I look forward to meeting with you.

Sincerely,

A handwritten signature in dark ink, appearing to read "Hap Boyd".

R. F. "Hap" Boyd

Natural gas. Electricity. Endless possibilities.

B

Folder Profile	
Control # 2001-018083	Name Letter to Secretary Spencer Abraham from Kenneth Lay, E
Priority Important	Folder Trigger Invitation
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Kenneth Lay, Enron Corp., invites Secretary Abraham as keynote speaker at "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis", Washington, D.C., 10/3/01 to 10/4/01	Date Received 8/1/01
Action Office # Regular	Correspondence Date 7/31/01
Signature/Approval NA	RIDS Information Head of Agency
	Sensitivity Not Applicable
	Classification None
	Point of Contact SEISERP
	Organization ID EXECCORR2
Action Requested Appropriate Action	Assigned To SL/Johnston
Special Instructions Info copy: ES/Carpenter. S-1 Regret 10/29/01	Date Due
	Date Completed 8/2/01

018083



2001-018083 8/1 P 12:07

Facsimile Cover Sheet

To: The Honorable Spencer Abraham
Company: U. S. Department of Energy
Phone: 202-586-6210
Fax: 202-586-4403

From: Kenneth Lay
Company: Office of the Chairman
Phone: 713/853-6773
Fax: 713/853-9479

Date: August 1, 2001

Pages including
this cover page: 2

Comments:

A

**Kenneth L. Lay***Chairman of the Board***Enron Corp.**

P.O. Box 1188

Houston, TX 77251-1188

713-853-6773

Fax 713-853-5313

kenneth.lay@enron.com

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U. S. Department of Energy
Forestal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary:

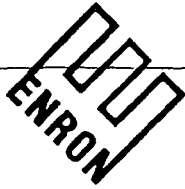
I'd like to follow up with you personally on a recent invitation extended by Jeff Skilling for an event Enron is hosting, **"U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis,"** in Washington, DC on October 3-4. We would be honored to have you as a featured keynote speaker to communicate your vision of America's energy future. The energy industry is at a critical juncture. Through this event, Enron is committed to creating an open dialogue for the industry to work together collectively and constructively to find solutions and discuss ways to get them implemented.

Your involvement in this industry forum represents an opportunity to engage with the most senior level stakeholders in our sector—key opinion leaders, policymakers, regulators, and business executives. This forum resonates with the industry. Our efforts thus far have generated a positive response, and we anticipate a productive and insightful discussion.

I'd appreciate your being part of this forum. Your participation would greatly enhance the prospects of a positive outcome.

Sincerely,

Folder Profile	
Control # 2001-018326	Name Invitation to Secretary Abraham from R.T. "Hap" Boyd
Priority Important Critical	Folder Trigger Invitation
DOE Addressee Spencer Abraham	Source PM-O
Subject Text R.T. Hap Boyd, Enron Wind Corp. requests a meeting with Secretary Abraham to give him a presentation on wind energy - No Date Mentioned	Date Received 8/3/01
Action Office # Regular	Correspondence Date 7/31/01
Signature/Approval NA	RIDS Information Head of Agency
Action Requested Appropriate Action	Sensitivity Not Applicable
Special Instructions Info copy: ES/Carpenter. Declined.	Classification None
	Point of Contact HOLLOWAG
	Organization ID EXECCORR2
	Assigned To SL/Johnston
	Date Due
	Date Completed 8/8/01



Enron Wind Corp.

444 South Flower Street, Suite 4545

Los Angeles, CA 90071-2946

(213) 452-4880

Fax (213) 452-4888

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue
Washington, D.C. 20585

Dear Mr. Secretary:

Enron Wind Corp (EWC) is one of the world leaders in the manufacture of wind turbines for utility scale electric generation. EWC has manufacturing facilities in California employing over 400 people and plants in Germany and Spain. Worldwide we employ 1,478 people.

4495MW of new wind energy capacity was added throughout the world in 2000 bringing total capacity to 18, 449MW. The U.S. had 2586MW wind capacity at the end of 2000. Installed world wind capacity is expected to grow at a rate of over 17% per year over the next five years. The U.S. will add 1500MW in 2001.

Not only is new wind capacity growing at a high rate, but costs are coming down so that wind generated electricity is expected to be cost competitive with fossil generation in three to five years.

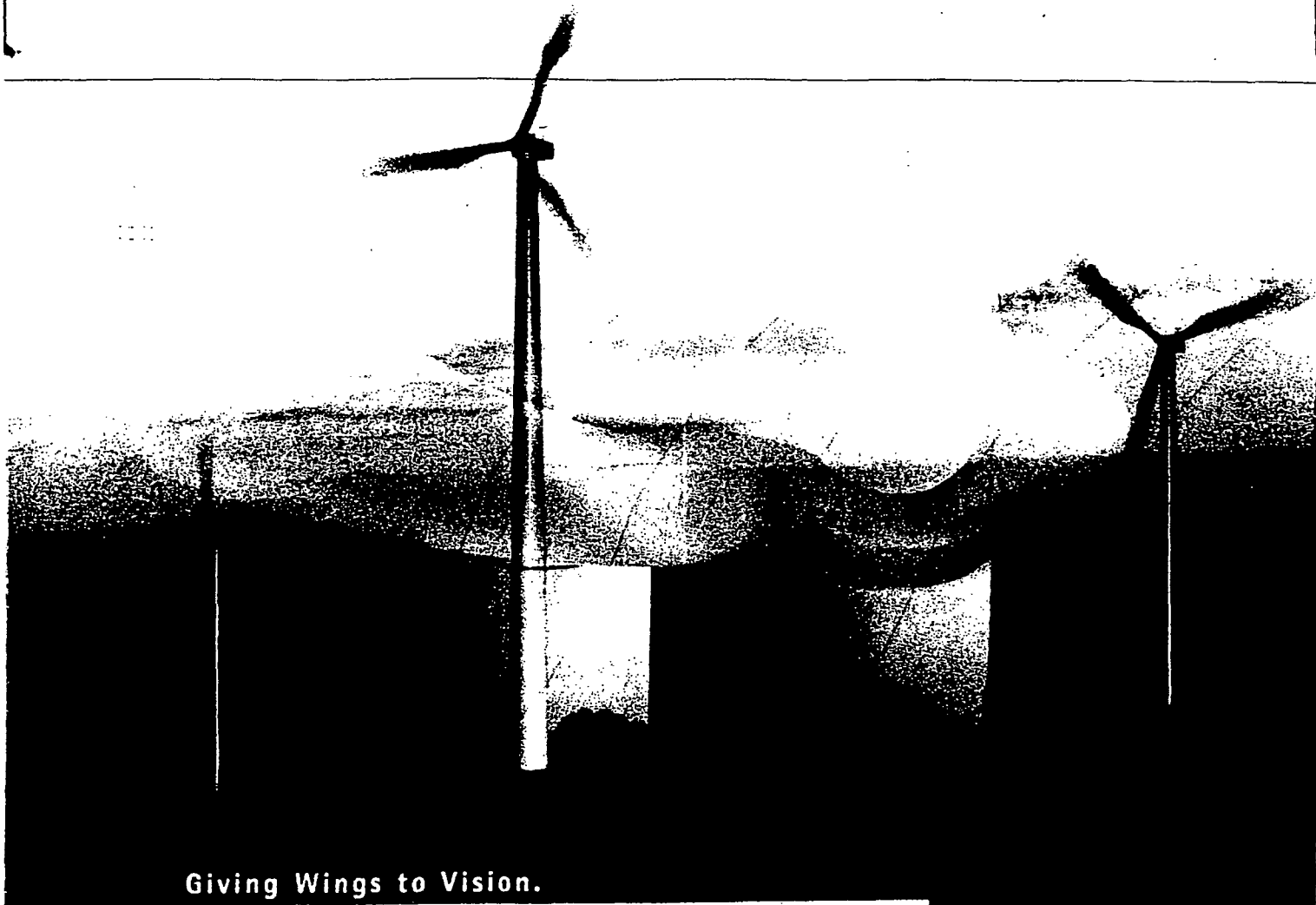
I mention these facts to you because I would like to request a meeting to give you a presentation on wind energy and its potential contribution of clean electricity to the nation's energy mix. I think that once you've heard the facts that you will become an enthusiastic supporter of wind technology.

I will follow up on this letter by contracting your scheduler to arrange a meeting.

I look forward to meeting with you.

Sincerely,

R.T. "Hap" Boyd



Giving Wings to Vision.

Folder Profile	
Control # 2001-018407	Name Letter to Spencer Abraham from Kenneth L. Lay, Chairman
Priority Important Critical	Folder Trigger Letter
DOE Addressee Spencer Abraham	Source PM-O
	Date Received 8/6/01
Subject Text Kenneth Lay, Enron, invites Secretary Abraham as keynote speaker at the event, "U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis," Washington, D.C., 10/3-10/4/01	Correspondence Date 7/31/01
Action Office # Regular	RIDS Information Head of Agency
	Sensitivity Not Applicable
Signature/Approval NA	Classification None
	Point of Contact SEISERP
	Organization ID EXECCORR2
Action Requested Appropriate Action	Assigned To SL/Johnston
Special Instructions Info copy: ES/Carpenter. Duplicate of 2001-018083. S-1 Regret 10/29/01	Date Due
	Date Completed 8/6/01

2001-018407 8/6/01 11:03

018407



Kenneth L. Lay
Chairman of the Board

Enron Corp.
P.O. Box 1188
Houston, TX 77251-1188
713-853-6773
Fax 713-853-5313
kenneth.lay@enron.com

July 31, 2001

The Honorable Spencer Abraham
Secretary of Energy
U.S. Department of Energy
Forrestal Building
1000 Independence Ave. SW
Washington, DC 20585-1000

Dear Mr. Secretary:

I'd like to follow up with you personally on a recent invitation extended by Jeff Skilling for an event Enron is hosting, **"U.S. Energy Policy at a Crossroads: Alternative Futures for the Current Energy Crisis,"** in Washington, DC on October 3-4. We would be honored to have you as a featured keynote speaker to communicate your vision of America's energy future. The energy industry is at a critical juncture. Through this event, Enron is committed to creating an open dialogue for the industry to work together collectively and constructively to find solutions and discuss ways to get them implemented.

Your involvement in this industry forum represents an opportunity to engage with the most senior level stakeholders in our sector--key opinion leaders, policymakers, regulators, and business executives. This forum resonates with the industry. Our efforts thus far have generated a positive response, and we anticipate a productive and insightful discussion.

I'd appreciate your being part of this forum. Your participation would greatly enhance the prospects of a positive outcome.

Sincerely,

A handwritten signature in dark ink, appearing to read "Kenneth L. Lay", written in a cursive, flowing style.

Folder Profile	
Control # 2001-018818	Name Letter to Secretary Abraham from Linda Robertson, Vice P
Priority Important	Folder Trigger Invitation
DOE Addressee Spencer Abraham	Source PM-O
Subject Text Linda Robertson writes on behalf of Jeff Skilling, CEO of Enron who would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition & upcoming legislation	Date Received 8/10/01
Action Office # Regular	Correspondence Date 8/10/01
Signature/Approval NA	RIDS Information Head of Agency
	Sensitivity Not Applicable
	Classification None
	Point of Contact CUNNINGD
	Organization ID EXECCORR2
Action Requested Appropriate Action	Assigned To SL/Johnston
Special Instructions 8/22/01 regretted by phone w/Laura	Date Due
	Date Completed 8/13/01

08/10/01 12:40 FAX

AUG 10 2001 12:04 PM ENRON

2001-018818 8/10/01 1:39

TO 5867573

0001

P.01/01

018818



Linda L. Robertson
Vice President
Federal Government Affairs

Enron
1775 Eye Street, NW, Suite 800
Washington, DC 20006
202-466-9159
Fax 202-828-3372
linda.robertson@enron.com

VIA FAX
202-586-7573 (fax)

August 10, 2001

The Honorable Spencer Abraham
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585
Attention: Ms. Cheryl Alford, Scheduler

Dear Ms. Alford:

Jeff Skilling, CEO of Enron would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition and upcoming legislation. Mr. Skilling is available for a meeting in Washington, DC on Tuesday, September 11, 2001 in the afternoon if this is possible.

At your convenience, please call me at 202-466-9159. I look forward to talking with you.

Sincerely,

A handwritten signature in cursive script, reading "Linda L. Robertson".

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Folder Profile	
Control #	2001-020031
Name	Fax to Secretary Abraham from Linda L. Robertson (Enron)
Priority	Important
DOE Addressee	Spencer Abraham
Subject Text	Linda L. Robertson, ENRON, would like to meet with Secretary Abraham in Washington, D.C., 9/18/01 or 9/19/01, to discuss electricity issues
Action Office #	Regular
Signature/Approval	NA
Action Requested	Appropriate Action
Special Instructions	Info copy: ES/Carpenter
Folder Trigger	Invitation
Source	PM-O
Date Received	8/29/01
Correspondence Date	8/28/01
RIDS Information	Head of Agency
Sensitivity	Not Applicable
Classification	None
Point of Contact	SEISERP
Organization ID	EXECCORR2
Assigned To	SL/Johnston
Date Due	
Date Completed	8/30/01

2001-020031 Aug 29 A 10:29



Linda L. Robertson
Vice President
Federal Government Affairs

Enron
1775 Eye Street, NW, Suite 800
Washington, DC 20006
202-466-9159
Fax 202-828-3372
linda.robertson@enron.com

VIA FAX
202-586-7573 (fax)

August 28, 2001

Ms. Robin Johnston
Scheduler
The Honorable Spencer Abraham
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Room 7A-257
Washington, DC 20585

Dear Ms. Johnston:

Ken Lay, Chairman and CEO of Enron would like to schedule a meeting with Secretary Abraham to discuss the state of electricity competition, and upcoming electricity legislation. Dr. Lay is available for a meeting in Washington, DC from September 18 through September 19, 2001.

At your convenience, please call me at 202-466-9159. I look forward to talking with you.

Sincerely,

A handwritten signature in cursive script that reads "Linda Robertson".

Endless possibilities.™

A.
1

Folder Profile	
Control #	2001-022232
Name	Letter to Deputy Secretary Francis Blake from Mark A. Frevert
Priority	Important
DOE Addressee	Francis S. Blake
Subject Text	Steve Kean, Linda Robertson, and Mark Frevert appreciated the opportunity to visit w/Deputy Secretary Blake to discuss energy issues; regret not getting a chance to see him at the conference
Action Office #	
Signature/Approval	NA
Action Requested	Appropriate Action
Special Instructions	
Folder Trigger	Letter
Source	PM-O
Date Received	10/1/01
Correspondence Date	9/26/01
RIDS Information	Head of Agency
Sensitivity	Not Applicable
Classification	None
Point of Contact	CARPENTC
Organization ID	EXECCORR2
Assigned To	Francis S. Blake
Date Due	
Date Completed	10/4/01

2001-022232 10/1 P 4:26



Mark A. Frevert
Vice Chairman

Enron Corp.
1400 Smith Street
Houston, TX 77002-7361

P.O. Box 1188
Houston, TX 77251-1188
713-853-6207
Fax 713-646-3330
mark.frevert@enron.com

September 26, 2001

The Honorable Francis Blake
Deputy Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Room 7B252
Washington, DC 20585

Dear Secretary Blake:

Steve Kean, Linda Robertson and I appreciated the opportunity to visit and have a chance to talk to you about energy issues. As this debate continues to unfold, we stand ready to be a resource to you whether it is policy analysis, economic research or historical industry information.

I'm sorry I didn't get a chance to see you at the conference the next morning, but I look forward to visiting again soon.

Best personal regards.

Sincerely,

Endless possibilities.™

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Attachment

[illegible]

STATEMENT OF CONSIDERATIONS

Request by Catalytica Combustion Systems, Inc. for an Advance Waiver of Domestic and Foreign Invention Rights under a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066; W(A)-99-012, CH-1006

The Petitioner, Catalytica Combustion Systems, Inc. (Catalytica), intends to enter into a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066. Under the cooperative agreement, entitled "Industrial Advanced Turbine Systems (ATS) Development and Design", Allison is to develop natural gas fired ATS suitable for cogeneration or mechanical drive applications in industrial markets. This cooperative agreement is under the ATS program initiated by the Department of Energy to serve industrial power generation markets. Under the proposed subcontract, Catalytica will design, test, and support Allison for the development of pre-competitive data as it relates to catalytic combustion technology that is to be incorporated in the ATS program. Further details for fulfilling these objectives are described in Catalytica's response to question 2 of the attached waiver petition, along with a copy of the Statement of Work from the cooperative agreement with Allison. Catalytica has requested a waiver of domestic and foreign rights for all subject inventions under its proposed subcontract with Allison. Allison has not requested an advance waiver under its cooperative agreement with DOE.

The total estimated cost of the subcontract is about \$1,043,062. Cost sharing of the project includes Catalytica's cost share of about \$365,072, or about 35%. The remaining cost share of the subcontract is provided through Allison's prime contract with DOE. It is anticipated that the length of this subcontract will be fourteen months.

In its response to questions 4 and 5 of the attached waiver petition, Catalytica has shown significant technical competence in developing technologies that further advance the art and science of catalytic combustion for gas turbines. Since 1988, it has developed and demonstrated the basic technology for the catalyst system, low NOx preburner, fuel-air mixing, control system, and mechanical support structures. This has been accomplished by the use of analytical modeling and rig testing, and is documented by the numerous patents and technical papers. Catalytica has collaborated with manufacturers in both the utility power generation and industrial applications markets such as General Electric, Solar Turbines, Pratt and Whitney Canada, and Allison Rolls Royce, and through these collaborations Catalytica is developing products based on catalytic combustion technology for introduction into the marketplace by the year 2002.

As indicated in response to questions 6 and 7, Catalytica has committed to the commercialization of catalytic combustion systems, and has invested over 30 million dollars in the technology and toward its eventual commercialization. Its goal is to expand the application range of catalytic combustion and to optimize the catalytic combustion system for the targeted market. A representative list of patents and publications, along with informational material describing the petitioner's combustion system, XOXON™, are attached to the waiver petition.

From its response to question 9, Catalytica indicates that there would be no effect on competition and market concentration by grant of the waiver because of expected competition with General Electric, Allison Rolls Royce and Solar Turbines. Catalytica states that since the market does not currently include a catalytic combustion option, the grant of the waiver will support an increase in competitive low NOx solutions.

The subject cooperative agreement will be modified to add the Patent Rights--Waiver clause in conformance with 10 CFR 784.12. This waiver clause will also include a paragraph entitled U.S. Competitiveness, in which Catalytica agrees to substantial U. S. manufacture of subject inventions (attached hereto). Additionally, Catalytica agrees not to transfer subject inventions to any other entity unless that other entity agrees to these same requirements. The petitioner has further agreed to modification of the data clause of the subject cooperative agreement (48 C.F.R. 952.227-14) by adding paragraph (k), Alternative VI, concerning contractor licensing of data.

Considering the foregoing, it is believed that granting the waiver will provide the Petitioner with the

A

necessary incentive to invest resources in the commercialization of the results of the agreement in a fashion which will make the agreement's benefits available to the public in the shortest practicable time. In addition, it would appear that grant of the above requested waiver would not result in an adverse effect on competition nor result in excessive market concentration. Therefore, in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver, as set forth above, be granted.

Mark P. Dvorscak

Mark P. Dvorscak
Assistant Chief Counsel
Office of Intellectual Property Law

Date Aug 30, 1999

Based on the foregoing Statement of Considerations and the representations in the attached waiver petition, it is determined that the United States and the general public will best be served by a waiver of rights and consent to assignment of the scope described above, and therefore the waiver is granted. This waiver shall not apply to any modification or extension of this agreement where through such modification or extension, the purpose, scope, or cost of the agreement is substantially altered.

CONCURRENCE:

Patricia A. Hoffman

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies

Date: Sept 20 1999

APPROVAL:

Paul A. Gottlieb

Paul A. Gottlieb
Assistant General Counsel
for Technology Transfer
and Intellectual Property

Date: 10-6-99

(t) U. S. COMPETITIVENESS The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.



Department of Energy
Washington, DC 20585

SEP - 1 1999

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies
EE-23 5F059/FORS

**SUBJECT: REQUEST BY CATALYTICA COMBUSTION SYSTEMS, INC. FOR AN
ADVANCE WAIVER OF DOMESTIC AND FOREIGN INVENTION RIGHTS
UNDER A SUBCONTRACT WITH ALLISON ENGINE COMPANY (ALLISON)
UNDER DOE COOPERATIVE AGREEMENT NO. DE-FC21-96MC33066;
W(A)-99-012, CH-1006**

Enclosed are a Statement of Considerations and a Waiver Petition for the subject waiver request recommending grant of the requested waiver. The reasons supporting this recommendation are set forth fully in the Statement of Considerations.

Please signify your concurrence by signing the attached Statement of Considerations and returning it to this office.

A handwritten signature in dark ink, appearing to read "Paul A. Gottlieb", is positioned above the printed name.

Paul A. Gottlieb
Assistant General Counsel
for Tech Transfer and Intellectual Property

Enclosures:
As Stated



U. S. Department of Energy
Federal Energy Technology Center

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940



June 30, 1999

MEMORANDUM FOR MARK DVORSCAK
ASSISTANT CHIEF COUNSEL

FROM: LISA A. JARR *Lisa A. Jarr*
PATENT COUNSEL

SUBJECT: Transmission of DOE/FETC Sub-Contractor Advance Patent Waiver
Petition -- DE-FC21-96MC33066

By this memo I am transmitting an advance patent waiver petition submitted by Catalytica in anticipation of entering into a subcontract with Rolls Royce Allison under the subject cooperative agreement. I have also sent Mr. Jecminek a copy of our standard advance patent waiver clause but I have not received any indication that it is acceptable to Catalytica.

Catalytica is unwilling to perform the subcontract unless they get the advance patent waiver. However, it is critical to the program to initiate this work as soon as possible. I spoke to Paul Gottlieb about getting advance approval and he said that he would consider that option but would prefer to not do so since we have been processing these petitions quickly. Thus, we would appreciate it if you would assign a high priority to this waiver petition.

Please provide me with the waiver numbers once assigned.

Attachments

44

UNITED STATES
DEPARTMENT OF ENERGY

PETITION FOR ADVANCE WAIVER OF PATENT
RIGHTS UNDER 10 CFR § 784

TO BE COMPLETED BY DOE:
HQ WAIVER NO.: _____
CH WAIVER NO.: _____

Title of Contract or Proposal Solar Turbines Incorporated / Rolls-Royce Allison
Joint Combustion Development with Catalytica Combustion Systems, Inc.
RFP No. 990122JCD Contract No. and Date (If executed) _____

The Catalytica Combustion Systems, Inc, 430 Ferguson Drive, Mountain View,
California 94043-5272

(Name and address of Petitioner)

does hereby petition the Secretary of the Department of Energy for waiver of patent rights of the United States of America to any invention(s) that may be made in the performance of work under the above-identified contract. It is understood that any waiver of rights shall be subject to the conditions set forth in 10 CFR § 784.

Is Contractor a small business as defined by 1-1.701 FPR? No

In support of this petition, answers to the following questions are submitted as an appendix hereto.

1. If this petition is for a waiver of rights other than domestic and foreign patent rights, describe the exact scope of the waiver requested.
2. Give a brief description of the scope of work of the above contract.
3. What is the dollar amount and period of performance of this contract?
4. Briefly describe Contractor's technical competence in the field of technology covered by the scope of work of this contract in terms of prior experience, know-how and patent position. (Attach exhibits to substantiate your technical competence, e.g., patents, technical publications, etc. If these are voluminous a representative sample is sufficient.)

A.

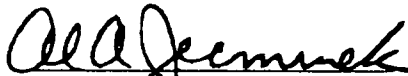
5. Briefly describe the Contractor's established commercial position in the field covered by the scope of work of the above contract. (Discuss in terms of selling goods or providing services in such field and in terms of market share where there is an existing market related to the contract work. Identify the proportion of sales to the Government. Attach exhibits to substantiate your commercial position, e.g., sales brochures, etc. If these are voluminous, a representative sample is sufficient.)
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7. To what extent will the Contractor make a substantial investment or effort which will directly benefit the work to be performed under the contract?
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9. What will be the effect on competition and market concentration if the above-requested waiver is granted? Would the acquisition of the waiver rights requested be likely to place Contractor in a preferred or dominant position in this field? Give reasons for your conclusions.
10. What other contracts has Contractor had with any Branch or Agency of the U.S. Government which include all or a part of the scope of work covered by this contract?
11. Is Contractor aware of any governmental regulations which require or which might require the use of the contract subject matter by the general public or a segment thereof? (If yes, explain.)
12. Does the work under this contract require an exploration into fields which concern the public health, safety or welfare: (for example, the development of drugs, medical or safety instruments, anti-pollution devices or such other products that may have a bearing on health, safety or welfare of the general public)? (If yes, explain.)
13. If Contractor is a nonprofit educational institution, what is the technology transfer capability and program of Contractor? Has this technology transfer capability and program been approved by DOE or any other agency?
14. Give any other facts that Contractor believes will establish that the interests of the United States and the general public will best be served by the granting of this waiver. Sufficient information is required so that the Secretary can consider specifically each of the areas and objectives covered in 10 CFR § 784.
15. (a) Have you within the past 6 months assigned or conveyed an interest to a party other than DOE in any patent or patent application covering a subject of the

work to be performed under the contract or entered into negotiations concerning such assignment or conveyance? (b) Do you plan to do so prior to contracting? (If yes, give details.)

16. State below the name, address and telephone number of the person to whom correspondence is to be directed.

The facts set forth in this request for waiver are within the knowledge of the requestor and are submitted with the intention that the Secretary or his designee rely on them in reaching the waiver determination.

Respectfully submitted,



(Signature)

Al A Jecminek
General Counsel

(Name and title of authorized representative)

Date submitted to DOE

June 23, 1999

Catalytica Combustion Systems, Inc., U.S. Patent Rights on Catalytic Combustion

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P-1073	Catalyst Support for High Temperature Applications and Catalysts and Catalytic Processes Employing Same	08/507,953
P-1074	Support Structure for a Catalyst	08/462,639
P-1077	Electrically-Heated Combustion Catalyst Structure and Method for Start-up of a Gas Turbine	08/688,075
P-1081	Improved Support Structures for a Catalyst	09/070,443

Opportunities for Alternatives in NO_x-Control – The XONON™ Combustion System –

Joseph Cussen, Director of Marketing, and J. Charles Solt, Director of Regulatory Affairs
Catalytica Combustion Systems, Inc.
430 Ferguson Drive, Mountain View, California 94043, USA

Introduction

Deregulation will provide new opportunities for both users and manufacturers of small gas turbines through distributed generation. But to capture this opportunity, users will have to meet new emission standards, which are now at single-digit levels and moving lower. XONON™ is a new, pollution-prevention NO_x-control technology that can allow distributed generation to satisfy this emerging market opportunity.

This paper will review current and future air regulations, discuss alternative compliance options, review how XONON works and explore some of the ways that XONON will enable distributed generation.

General Trends in Air Emissions Regulations

In the U.S. today, the New Source Review (NSR) regulations pose the constraining emissions limitations for new gas turbines. These regulations require the use of Lowest Achievable Emission Rate (LAER) in areas that currently do not meet the ambient air quality standards, and Best Available Control Technology (BACT) in areas that do. Currently, gas turbines are restricted in new permits to less than 5 parts per million (ppm) NO_x for both LAER and BACT requirements. And, recent actions by the EPA and the South Coast Air Quality Management District (SCAQMD) in California indicate that required NO_x levels could move even lower.

As air emission requirements tighten, new technologies will be required to meet them. This situation presents challenges, but also opportunities for gas turbine users and manufacturers. To realize the opportunities, we must first understand how NO_x is formed and the current NO_x-control options available.

NO_x Formation

NO_x is composed of oxygen and nitrogen, so the air entering the engine, consisting of 21% oxygen and 79% nitrogen, contains all the ingredients necessary to produce this pollutant. The only additional factor required is a temperature high enough to cause oxygen and nitrogen to combine (see Figure 1). Turbine manufacturers try to prevent the formation of NO_x primarily by reducing the peak flame temperature below the range in which NO_x is formed.

facility, fuel will be required to replace the steam injected, so both water and steam injection significantly increase the overall fuel requirements. Applications of these technologies can result in a substantial increase (> 50 ppm) in carbon monoxide (CO) and (UHC).

Lean Premixed Technology

Turbine manufacturers then developed processes that use air as a diluent rather than water or steam. Manufacturers achieved this by premixing the fuel and air before they enter the combustor. This type of process is called *lean premix combustion*. Lean premix combustion processes developed by gas turbine manufacturers have a variety of names, including the Dry-Low NO_x (DLN) process of General Electric, the Dry-Low Emissions (DLE) process of Rolls-Royce and the SoLoNO_x process of Solar Turbines.

Most industrial gas turbine manufacturers have programs to develop lean premix combustion systems. Most of the commercially available systems are guaranteed to reduce NO_x emissions to about 15 – 25 ppm, depending on the manufacturer and the particular turbine model. A few manufacturers have guaranteed lower emission levels, in the range of 10 – 15 ppm, but some of these manufacturers are also experiencing problems with combustion noise and combustor deterioration. Applications of these technologies can result in a substantial increase (> 50 ppm) in CO and UHC.

Options for Less than 5 ppm NO_x

While we've discussed various general options for NO_x-control, there are really only two practical approaches to meeting the new LAER and BACT requirements of less than 5 ppm NO_x—one is to prevent NO_x formation, and the other is to clean it up in the exhaust. A pollution prevention technology, such as XONON, is preferred because it minimizes production of NO_x within the combustor itself. Clean-up systems—selective catalytic reduction and SCONOX—are large, expensive units added to the gas turbine exhaust to remove already produced pollutants.

FEATURE	POLLUTION CLEAN-UP		POLLUTION PREVENTION
	LPM + SCR	LPM + SCONOX	XONON
Emissions (ppm)	< 3	< 3	< 3
Environmental and Safety Impacts	Many	Some	None
Application Limitations	Some	Many	None
Cost Impact	High	Highest	Lowest
Proven in Practice	Yes	In process	In process

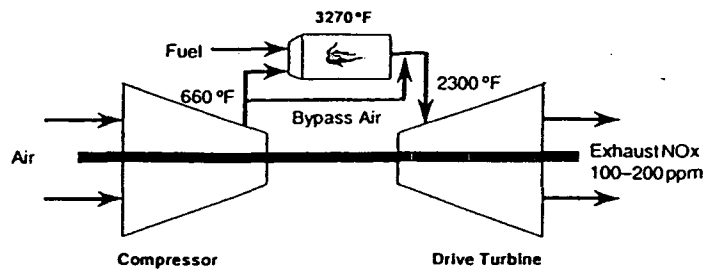


Figure 2a - Traditional Flame Combustion

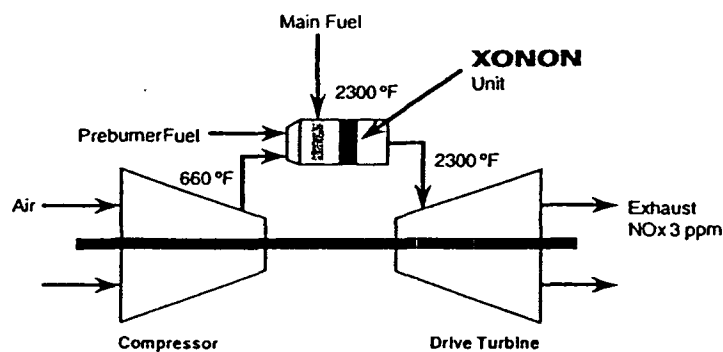


Figure 2b - The XONON Combustion System

With extensive development, lean pre-mix combustion systems have achieved NOx levels of about 25 ppm and, in a few cases, 15 ppm. However, XONON has already demonstrated in full-scale tests at turbine operating conditions on a variety of turbines NOx levels of less than 3 ppm.

The Market Advantage

XONON is a pollution-prevention technology. Therefore, it eliminates the need for an expensive exhaust gas clean-up system, like selective catalytic reduction. At less than 3 ppm NOx, XONON can minimize costly offset requirements and may generate emission reduction credits (or ERCs). XONON enables faster permitting, allowing the operation to get on-line and generate revenues sooner. And, XONON does not impact engine performance and produces ultra-low vibration—both of which improve engine operations.

project. However, even the smaller projects are finding that costly control technologies often destroy the economic feasibility of a project:

- Permits in attainment areas require 9 to 25 ppm.
- The majority of distributed generation opportunities (over 85%) are in non-attainment areas which require permits of 3 to 15 ppm.
- Most manufacturers currently guarantee 25ppm.
- Emission controls to achieve less than 25 ppm will increase the cost of power generation by over 7 mills per KWH (see Table 1).

XONON Benefits

XONON has a number of benefits in applying and permitting distributed generation in areas that require permit levels below 25 ppm:

- XONON can be applied on any turbine application, regardless of whether exhaust heat is being recovered.
- XONON does not require hazardous material storage and handling with all of the attendant training, reporting, record keeping and hazardous planning.
- Permitting is much simpler and shorter, allowing the project revenue to start earlier.
- Total cost impact is less than half of add-on controls (see Table 1).

Cost Comparison of NOx Control Options			
Model	Solar Taurus 60		
General Parameters			
Rating (MW)	5.20		
Engine Efficiency	30%		
Annual Operation (Hrs/Year)	8,000		
Power Value (\$/KW Hr)	0.060		
Fuel Cost (\$/MMBtu)	2.95		
Ammonia Price (\$/lb)	0.15		
Burdened Labor rate (\$/Hr.)	42.00		
Cost of Offsets/ERCs (\$/Ton)	\$3,500		
Life (Years)	15		
Interest Rate (%)	11		
Net Heat Rate (Btu/KW Hr)	5,650		Cogeneration
Crtl. Path Threshold for Prmtg. (Months)	3		
NOx Control Technology		DLN+SCR	XONON
Required Emission Level (ppm)		3	3
Controlled NOx Level (ppm)		3	3
SCR Effectivity Required (% Removed)		88%	NA
Guaranteed Catalyst Life		3 Years	1 Year
Air Permit Time (Months)		5	3
Owning and Operating Cost	NPV	(2,987,378)	(753,485)
Cost Impact [+/-]	\$/KWH	0.0072	0.0035

Table 1 – Cost Comparison of NOx Control Options

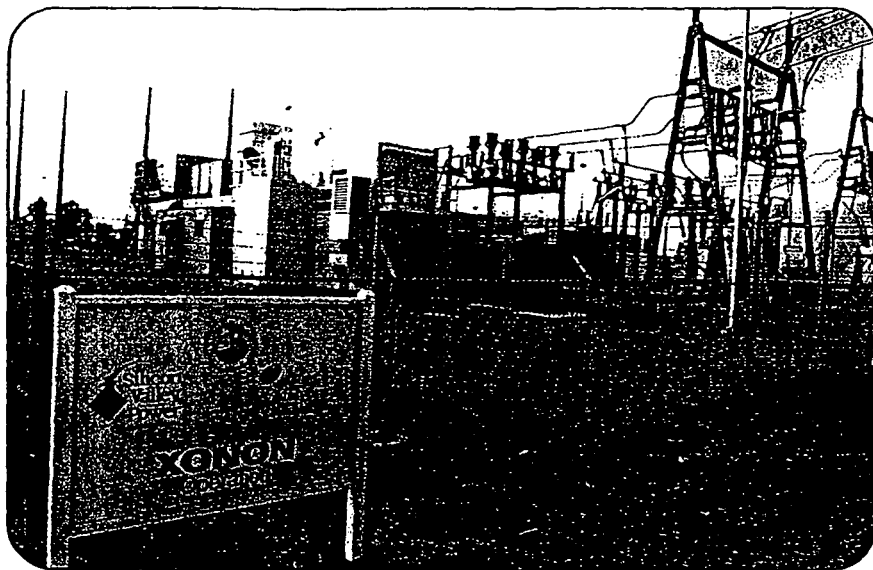
Distributed Generation Opportunities

The primary application opportunity for distributed generation is displacing purchased power at a facility. With rate unbundling, commercial, industrial and institutional facilities can install generation to meet their facilities unique power requirements, and frequently pay for the facility with savings from the purchased power. Usually, this is

5. Briefly describe the Contractor's established commercial position in the field covered by the scope of work of the above contract. (Discuss in terms of selling goods or providing services in such field and in terms of market share where there is an existing market related to the contract work. Identify the proportion of sales to the Government. Attach exhibits to substantiate your commercial position. e.g., sales brochures, etc. If these are voluminous, a representative sample is sufficient.)
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15. (a) Have you within the past 6 months assigned or conveyed an interest to a party other than DOE in any patent or patent application covering a subject of the

Commercialization of Low-NO_x Combustion System

by Mike Osenga



With installation in a commercial power generation application, Catalytica Combustion Systems feels it has cleared two of the three market hurdles for acceptance of its Xonon combustion system. The Xonon system has demonstrated an ability to limit NO_x emissions to less than 3 ppm in a test installation.

With its first installation in a gas turbine power generation application now operational and a new agreement in place with GE to commercialize its technology, Catalytica Combustion Systems, Inc., feels it has passed most of the major hurdles for market acceptance in its Xonon pollution prevention technology.

"The market told us we had to do three things to prove the Xonon combustor technology worked," said Dennis Orwig, president and chief executive officer of Catalytica, Mountain View, California. "They said we had to have a prototype installation. With over 1100 hours and 220 starts on a Kawasaki turbine at the AGC Project Development in Tulsa, Oklahoma, that documented Xonon's ability to limit NO_x to less than 3 ppm (and 10 ppm CO), we've done that.

"They said we had to get a system on the grid, and with the Gianera Generating Station, we've done that. The only remaining step, based on what the marketplace told us, is commercial operating history to prove the durability of Xonon, and we're well along that road," Orwig said.

The first commercial application of the Xonon technology became operational in October 1998, at the Gianera Genera-

ting Station of Silicon Valley Power, a municipally owned utility serving Santa Clara, California. The turbine at Gianera is the same Kawasaki M1A-13 gas turbine, now owned by Catalytica, used in the testing at Tulsa, and upgraded to M1A-13A1 specifications. The test at Gianera is expected to last 8000 hours. The utility will host the Xonon turbine system, purchasing its output at competitive costs.

The installation in Silicon Valley caps a busy year for Catalytica. Near the end of 1998 the company announced an agreement with General Electric under which

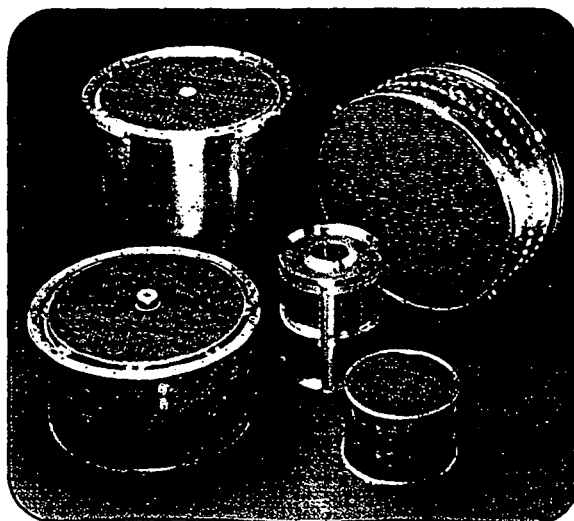
the two companies will collaborate to accelerate commercialization of the Xonon system in GE gas turbines. The agreement for the two companies covers cooperation in the design, application and commercialization of Xonon systems for both new and installed GE E-class and F-class turbines used in power generation and mechanical drive applications.

This is the second agreement Catalytica has signed with a turbine manufacturer following an agreement with Pratt & Whitney Canada which calls for using the Xonon system of the ST18 and ST30 turbines.

The Xonon system, detailed in earlier issues of *Diesel & Gas Turbine Worldwide*, is a flameless combustion system designed to achieve low-NO_x emissions in turbines used in a variety of power generation applications, as well as gas transmission in pipelines.

The system is an integral part of a gas turbine combustion system and, Catalytica says, is a NO_x prevention system, not an after-the-fact clean-up system. It is based on a catalytic combustion process in which fuel and air react on a catalytic surface, releasing energy to power the turbine.

Also in 1998, Catalytica joined the Monterey Bay Alliance, a consortium of five companies who are expected to offer a "total solution package of cost-effective, environmentally sound products and services," and that includes Enron Energy Services, Inc., Harding Lawson Associates, PowerCell On-Site Energy Systems and Pratt & Whitney Canada. Enron also purchased 15% in Catalytica Combustion Systems for US\$30 million with an option to purchase another 5% within three years.



Catalytica's Xonon catalyst modules for Kawasaki, GE, Allison, and Pratt & Whitney gas turbines.

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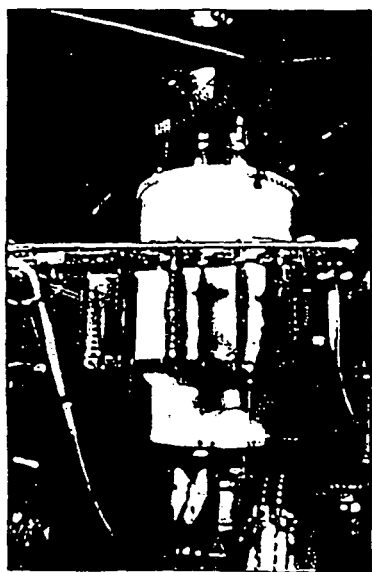


Catalytica
Combustion Systems

The XONON™ Combustion System at Silicon Valley Power



The first commercial installation of XONON at Silicon Valley Power, a municipally owned electric utility in Santa Clara, California.



The XONON-2 beta version of commercial combustor installed at Silicon Valley Power



The XONON family of catalyst modules for Kawasaki, GE, Rolls Royce, and Pratt & Whitney gas turbines

Tests of catalytic-combustion technology show low emissions

J. Charles Solt, James C. Schlatter / Catalytic Combustion Systems Inc., Mountain View, Calif.

Turbine-inlet temperatures of 1,900-2,000° F are required to produce energy, depending upon the turbine design. Combustion of fuels, however, occurs at temperatures greater than 2,800° F.

At these temperatures nitrogen and oxygen combine to produce nitrous oxide (NO_x), a U.S. Environmental Protection Agency criteria pollutant that contributes to the formation of ozone.

Impact on natural-gas pipeline operations

Because gas turbines are used to drive compressors, NO_x regulations will also affect pipeline operators. Specifically, there are two federal programs under development that will significantly impact both existing and new gas turbine pipeline compression stations.

- Ozone Transport Assessment Group (OTAG) has recommended regulatory changes to prevent attainment areas from negatively impacting downwind non-attainment areas.

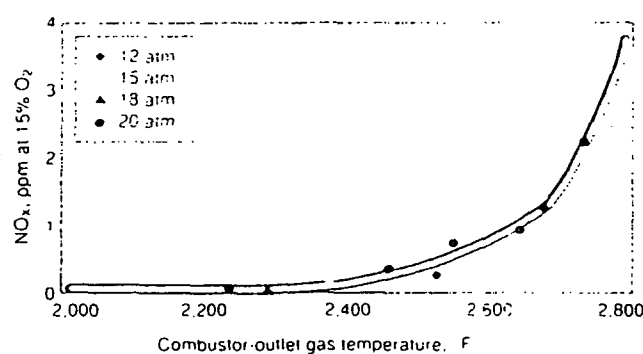
- National Ambient Air Quality Standards revisions signed by President Clinton last June will tighten the standards for ozone and particulate matter.

Pipeline companies would, therefore, be well advised to consider technologies now that will mitigate the impact of these impending regulations.

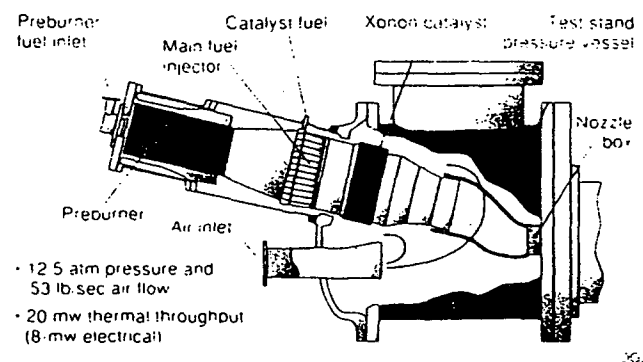
A flameless catalytic combustion process, Xonon, developed by Catalytic Combustion Systems Inc. (CCSI), Mountain View, Calif., combusts fuels at less than 2,400° F.

Two full-scale tests and another on an actual turbine in the field have indicated that

XONON IMPACT ON NO_x FORMATION



GE 7/9 EA FULL-SCALE XONON COMBUSTOR



Xonon consistently achieves NO_x emissions of <3 ppm while maintaining optimum operating conditions in the turbine.

In November 1996, CCSI received its first commercial contract for Xonon when the City of Glendale, Calif., agreed to retrofit a Pratt & Whitney FT-4 turbine with Xonon at its Grayson power plant. The system will be delivered in early 1999.

GE announced its intent in June 1997 to market the Xonon system to its installed base of gas turbines worldwide. In December 1997, Enron Ventures Corp. announced it will invest \$30 million to help ac-

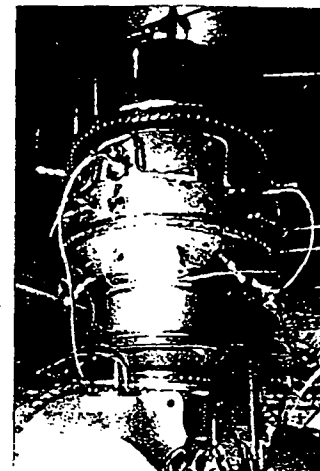
celerate Xonon's commercialization.

NO_x -control technologies

The amount of NO_x produced in a combustion process depends on the maximum temperature attained at any point in the combustor and on the total time at this temperature (Fig. 1).

A typical gas turbine combustor would have a gas residence time in the range of 10-100 ms, depending upon the combustor design. To minimize NO_x formation it is necessary to reduce the average temperature of the combustor and to eliminate hot spots.

Hot spots are small regions



Full-scale testing of the Xonon emissions-reducing combustion technology continues on a Kawasaki M1A-13A engine in Tulsa. The engine has achieved more than 1,100 operating hr and 220 cycles of start-up/shut-down (Fig. 3).

where a high fuel/air ratio results in high local temperatures. Eliminating them eliminates the major cause of high NO_x levels, as shown by the rapid rise in NO_x level as the temperature increases.

During the last 20 years, scientists have been working to develop technologies that reduce NO_x emissions while maintaining optimum temperatures and turbine performance. Standard diffusion-flame combustors produce NO_x in a range of 100-200 ppm, levels prohibited under current U.S. federal and state regulations.

Dry controls, in which more air is used in the primary combustion zone than is necessary to burn all the fuel, were initially used to lower the peak temperature and reduce NO_x formation. But these reduced NO_x by only 10-20%.

Wet controls, in which water or steam is injected into



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THE ULTIMATE NO_x SOLUTION FOR GAS TURBINES

J. Charles Solt

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Catalytica Combustion Systems Inc.

www.catalytica-inc.com

ABSTRACT

Since the introduction of emission standards for gas turbines in the late '70s and early '80s, the gas turbine industry has responded with a variety of combustion and cleanup alternatives that have improved emissions. While the emissions were being reduced, the cost of control, and the negative environmental impacts were often significant.

Thanks to a technological breakthrough, catalytic combustion has now been achieved, and can fulfill the promise of low cost NO_x elimination without the high cost of SCR or the operational problems associated with Lean Pre-Mix.

NO_x Formation

NO_x is composed of oxygen and nitrogen, so the air entering the engine, consisting of 21% oxygen and 79% nitrogen, contains all the ingredients necessary to produce this pollutant. The only additional factor that is required is a temperature high enough to cause oxygen and nitrogen to combine (see Fig 1). Turbine manufacturers try to prevent the formation of NO_x primarily by reducing the peak flame temperature below the range in which NO_x is formed.

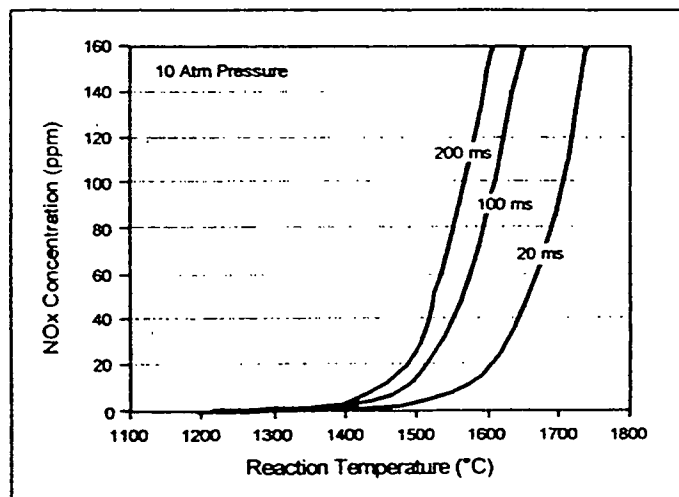


Figure 1. NO_x Formation as a function of Time and Temperature

Diffusion Flame Combustion

Before the concern about NO_x emissions arose, gas turbine manufacturers primarily aimed at building a rugged, long-life combustor with a good temperature distribution, reliable light-off, and which would not flame out under transient load conditions. To achieve these design goals it was helpful to burn the fuel under conditions that were very close to stoichiometric, that is, conditions where there is just enough oxygen to burn all of the fuel. Under



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SINGLE-DIGIT EMISSIONS IN A FULL SCALE CATALYTIC COMBUSTOR

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Toshiaki Tsuchiya
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Tokyo, Japan

ABSTRACT

Catalytic combustion offers the possibility of attaining the firing temperatures of current and next generation gas turbines [up to -1450°C (2640°F)] with nitrogen oxides (NOx) production as low as 1 part per million by volume (ppmv). Such catalytic combustion technology has been under development at Catalytica for several years, and the first full scale test of the technology took place at the General Electric Company under TEPCO sponsorship in 1992. The results of the most recent and most successful full scale test in this program are reported in this paper.

The catalytic combustor system was designed for the GE Model MS9001E gas turbine fired with natural gas fuel. The 508-mm (20-in) diameter catalytic reactor was operated at conditions representative of the startup and load cycle of that machine. It was verified that the observed NOx levels were produced not in the catalyst, but in the diffusion flame of the preburner used to start the system and maintain the necessary catalyst inlet temperature. Even so, NOx levels below 5 ppmv (at 15% O_2) were achieved at the simulated base load operating point. Carbon monoxide (CO) and unburned hydrocarbons (UHC) emissions were likewise below 10 ppmv at that condition. Single digit emissions levels also were recorded at conditions representative of the combustor operating at 78% load, the first such demonstration of the turndown capability of this system. Throughout the test, dynamic pressure measurements showed the catalytic combustor to be quieter than even the diffusion flame combustors currently in commercial service.

INTRODUCTION

The technologies currently practiced for controlling NOx emissions from heavy-duty industrial gas turbines involve either diluent injection into the combustor reaction zone or lean premixed combustion. To meet increasingly stringent emissions regulations,

many turbine installations must also include a selective catalytic reduction (SCR) unit on the exhaust stream to remove NOx produced in the combustor.

GE has commercialized Dry Low NOx (DLN) systems based upon lean premixed combustion technology to deliver NOx emissions levels of 15-20 ppmv in existing power plants. [All NOx concentrations shown in this paper are corrected to 15% O_2]. The latest versions of the DLN systems are designed for 9 ppmv. At single digit NOx levels, however, lean premixed systems are being pushed to the limits of flame stability; and this may preclude further significant reductions in NOx emissions via this approach. Thus there is an incentive to develop a new generation of combustion systems that can achieve NOx levels of 3-5 ppmv without incurring the capital and operating costs associated with diluent injection and SCR systems.

NOx production in a gas turbine combustor occurs predominantly within the flame zone, where localized high temperatures sustain the NOx-forming reactions. The overall average gas temperature required to drive the turbine is well below the flame temperature, but the flame region is required to achieve stable combustion. Because catalytic combustion offers the possibility of achieving full conversion of a fuel/air mixture without the presence of a flame and its associated NOx formation reactions, it offers the potential for delivering ultra-low NOx levels without the need for SCR or other exhaust after-treatment.

This potential of catalytic combustion has been recognized for 20 years (Pfefferle, 1975), but the environment in a gas turbine combustor presents significant challenges for a catalyst. The gas temperature required at the combustor exit ranges from 1175°C to 1500°C (2150°F to 2730°F), depending upon the particular turbine design. Such temperatures are well above the stability limits of most catalytic materials. Even ceramics that can survive the combustor temperatures are susceptible to thermal shock failure

¹ Currently at Catalytica Combustion Systems, Inc.



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DEVELOPMENT OF A CATALYTIC COMBUSTOR FOR A HEAVY-DUTY UTILITY GAS TURBINE

Ralph A. Dalla Betta
James C. Schlatter
Sarento G. Nickolas
Catalytica Inc.
Mountain View, California

Martin B. Cutrone
Kenneth W. Beebe
General Electric Co.
Schenectady, New York

Yutaka Furuse
Toshiaki Tsuchiya
Tokyo Electric Power Co.
Yokohama, Japan

ABSTRACT

The most effective technologies currently available for controlling NO_x emissions from heavy-duty industrial gas turbines are either diluent injection in the combustor reaction zone, or lean premixed Dry Low NO_x (DLN) combustion. For ultra low emissions requirements, these must be combined with selective catalytic reduction (SCR) DeNO_x systems in the gas turbine exhaust. An alternative technology for achieving comparable emissions levels with the potential for lower capital investment and operating cost is catalytic combustion of lean premixed fuel and air within the gas turbine. The design of a catalytic combustion system using natural gas fuel has been prepared for the GE model MS9001E gas turbine. This machine has a turbine inlet temperature to the first rotating stage of over 1100°C and produces approximately 105 MW electrical output in simple cycle operation. The 508 mm diameter catalytic combustor designed for this gas turbine was operated at full-scale conditions in tests conducted in 1992 and 1994. The combustor was operated for twelve hours during the 1994 test and demonstrated very low NO_x emissions from the catalytic reactor. The total exhaust NO_x level was approximately 12-15 ppmv and was produced almost entirely in the preburner ahead of the reactor. A small quantity of steam injected into the preburner reduced the NO_x emissions to 5-6 ppmv.

Development of the combustion system has continued with the objectives of reducing CO and UHC emissions, understanding the parameters affecting reactor stability and spatial non-uniformities which were observed at low inlet temperature, and improving the structural integrity of the reactor system to a level required for commercial operation of gas turbines. Design modifications were completed and combustion hardware was fabricated for additional full-scale tests of the catalytic combustion system in March 1995 and January 1996. This paper presents a discussion of the combustor design, the catalytic reactor design and the results of full-scale testing of the improved combustor at MS9001E cycle conditions in the March 1995 and January 1996 tests. Major improvements in performance were achieved with CO and UHC emissions of 10 ppmv and 0 ppmv at base load conditions.

This ongoing program will lead to two additional full-scale combustion system tests in 1996. The results of these tests will be available for discussion at the June 1996 Conference in Birmingham.

NOMENCLATURE

CO = Carbon monoxide emissions
DLN = Dry Low NO_x
FSNL = Full Speed No Load
ISO = International Standards Organization
MVT = Multiple Venturi Tube type fuel injector
MWe = Megawatts electrical output
NO_x = Oxides of nitrogen emissions
ppm = Parts Per Million by volume
SCR = Selective catalytic reduction
UHC = Unburned Hydrocarbon emissions

INTRODUCTION

Trends in environmental regulations are necessitating use of clean burning fuels (particularly natural gas), advanced gas turbine combustion systems which reduce the amount of NO_x formed during the combustion process and, where emissions regulations are at the single-digit NO_x levels, use of Selective Catalytic Reduction (SCR) of the NO_x in the gas turbine exhaust. An example is California where NO_x levels of newly constructed combined cycle plants are regulated to as low as 5 ppm (at 15% O₂).

Consequently, the incentive now exists for development of a new generation of combustion systems capable of meeting NO_x emissions levels of approximately 3-5 ppm, directly within the turbine, without recourse to downstream denitrification by SCR in the turbine exhaust. This new generation of combustion systems should be suitable for turbines firing at today's turbine inlet temperatures of approximately 1290°C (at the inlet of the first stage rotor), with growth potential to the next generation of turbines expected to fire at approximately 1427°C. The costs associated with heat rate deterioration due to diluent injection, combined with capital and operating costs required for SCR systems, provides substantial economic incentive to develop ultra-low NO_x combustion systems for application to combined cycle and cogeneration power plants incorporating gas turbines.

Direct catalytic combustion has significant potential, as demonstrated by tests performed at GE for natural gas fuel with very low emissions of NO_x, CO and UHC. A promising concept for the catalytic combustion of natural gas has been developed by Catalytica/Tanaka Kikinzoku Kogyo K.K. In general terms, the design involves partially reacting the fuel-air mixture within the catalytic reactor to generate a gas temperature of

Presented at the International Gas Turbine and Aeroengine Congress & Exhibition
Birmingham, UK — June 10-13, 1996

This paper has been accepted for publication in the Transactions of the ASME
Discussion of it will be accepted at ASME Headquarters until September 30, 1996



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DESIGN AND EVALUATION OF A SINGLE-CAN FULL SCALE CATALYTIC COMBUSTION SYSTEM FOR ULTRA-LOW EMISSIONS INDUSTRIAL GAS TURBINES

P. Dutta and L. H. Cowell
Solar Turbines Incorporated
San Diego, California

D. K. Yee and R. A. Dalla Betta
Catalytica Inc.
Mountain View, California

ABSTRACT

The goal of the Advanced Turbine Systems (ATS) program is the design and development of high thermal efficiency gas turbines with pollutant emissions at single digit levels, through the development of advanced recuperated gas turbines. Following successful subscale catalytic reactor testing, a full scale catalytic combustion system was designed to be representative of a single can in a multi-can gas turbine combustor configuration. The full scale catalytic combustion system is modular in design and includes a fuel/air premixer upstream of the catalytic reactor and a post catalyst homogeneous combustion zone downstream of the catalyst bed to complete the homogeneous gas-phase reactions. System start-up is accomplished using a lean-premixed (LP) low emissions fuel injector. The system transitions to catalyst operation using a variable geometry valve that diverts air flow into the catalyst at loads greater than 50% of full load. The variable geometry valve is used to operate the catalyst within the narrow operating window due to limited fuel/air turndown allowed by the catalyst. A catalyst design with preferential catalyst coating on a corrugated metal substrate to limit catalyst substrate temperatures was selected for the system. Mean fuel concentration measurements at the inlet to the catalyst bed using an instrumented catalyst module showed the fuel/air premixing to be within catalyst specifications. Preliminary combustion tests on the system were completed. The catalytic combustion system was tested over the 50-to-100% load range. Using variable geometry control, emissions goals (< 5 ppmv NO_x, < 10 ppmv CO and UHC corrected to 15% O₂) were achieved for catalyst operation between 50-and-100% load conditions. The system was started and operated under part-load conditions using the LP injector. Efforts are under way to accomplish successful transition from LP mode of operation to catalytic mode of operation using the variable geometry system.

INTRODUCTION

The goal of the Advanced Turbine Systems (ATS) program is the design and development of high thermal efficiency gas turbines with NO_x emissions at single digit levels over the 50 to 100% load range, while achieving high thermal efficiency, through the development of advanced recuperated gas turbines. Catalytic combustion was selected as an approach

capable of attaining the emissions goals of the ATS gas turbines. Initial work focused on the subscale evaluation of catalytic reactors under simulated gas turbine conditions, and the results from the subscale development tests have been reported elsewhere (Topical Report, 1996). Following successful subscale catalytic reactor testing, a full-scale catalytic combustion system representative of a single can in a multi-can gas turbine combustor configuration was designed. On successful evaluation of this catalytic combustion system, a full set of hardware will be procured for an engine demonstration. This paper discusses the concept and design of a full scale catalytic combustion system and preliminary test results from rig testing at simulated gas turbine conditions.

BACKGROUND

Catalytic combustion is a lean-premixed combustion process where a catalyst is used to initiate and promote chemical reactions in a premixed fuel-air mixture at leaner conditions than are possible in homogeneous gas-phase combustion. This allows stable combustion of lean fuel/air mixtures with adiabatic combustion temperatures less than 1650 K, so that NO_x emissions less than 5 ppmv can be achieved.

Even though the concept of catalytically stabilized combustion was demonstrated in the early '70s (Pfefferle, 1975), the technology has not yet been applied to field gas turbine combustors. During the initial development stages, materials issues related to high substrate temperatures, problems of sintering and deactivation of catalyst, and thermal shock resistance prevented the successful application of the technology in gas turbines. Recent development efforts are concentrated on innovative catalyst and system designs to circumvent the non-availability of reliable high temperature catalysts. There are currently three primary approaches to the design of catalytic combustion systems for gas turbine combustors: 1) systems using high temperature catalysts (e.g. Mn/Ba/La substituted hexaaluminates); 2) systems where only a part of the fuel is injected upstream of the catalyst (to limit catalyst temperatures) and the rest of the fuel is injected downstream of the catalyst (to obtain the desired temperature rise in the combustor); and 3) systems where all the fuel is injected upstream of the catalyst and partially reacted in the catalyst bed, and combustion is



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APPLICATION OF CATALYTIC COMBUSTION TECHNOLOGY TO INDUSTRIAL GAS TURBINES FOR ULTRA-LOW NO_x EMISSIONS

Ralph A. Dalla Betta, James C. Schlatter and Sorento G. Nickolas
Catalytica, Inc.
Mountain View, California

Mohan K. Razdan and Duane A. Smith
Allison Engine Company
Indianapolis, Indiana

ABSTRACT

An operating cycle had been developed for a catalytic combustion system applied to the Allison 501-KB7 engine. This cycle used overboard bleed of diffuser air to maintain a high fuel/air ratio at the catalyst and thus achieve a high combustor outlet temperature with attendant low CO and UHC emissions. For the design point of this engine, the emissions measured at full pressure and temperature in a subscale catalyst test rig were <1 ppm NO_x and <2 ppm CO and UHC. Tests over the full operating cycle showed that the catalytic combustor system would achieve low emissions from 20 to 100% load.

The use of catalytic combustion on a high efficiency gas turbine engine design was also evaluated. Pressures up to 20 atm and combustor outlet temperatures up to 1500°C (2730°F) were demonstrated with NO_x emissions <2.2 ppm and CO and UHC <2 ppm. These results show that catalytic combustion is a viable technology for application to a high pressure, high temperature industrial gas turbine engine design.

INTRODUCTION

Substantial past and present work is directed at reducing the NO_x emissions from gas turbine engines. This objective is driven by the increasingly stringent requirements imposed by regulatory agencies in ozone nonattainment areas, by Best Available Control Technology (BACT) determinations under the Prevention of Significant Deterioration (PSD) regulations for NO_x and under the Clean Air Act legislation.

The target emissions level for NO_x is <10 ppm and in many cases <5 ppm. Current technology to meet these targets requires the use of low NO_x combustor technology plus post exhaust treatment by selective catalytic reduction. This results in high capital and operating costs. Improved low cost emissions control technology is needed.

Most of the current dry low emissions approaches for industrial gas turbine engines are based on lean premixing of fuel and air and unique ways to stabilize combustion throughout the engine operating cycle (Razdan, et al., 1994; McLeroy, et al., 1995). There is, however, a lower limit to NO_x emissions achievable with conventional methods for combustion of lean premixed fuel/air mixtures. This is due to the fact that there is a lower limit to fuel/air equivalence ratio (about 0.5 for natural gas) below which combustion becomes unstable in practical gas turbine combustors. At very low fuel/air ratios, it is impossible to practically stabilize combustion with conventional methods such as recirculation through swirlers, transverse primary jets or bluff bodies. One technology that can stabilize the combustion of ultra-lean fuel/air mixtures is catalytically stabilized combustion. A catalyst can stabilize combustion at equivalence ratios substantially below 0.5, thus limiting the maximum temperature to less than the threshold of thermal NO_x production, approximately 1550°C (2820°F).

A new staged catalytic combustion technology has been developed by Catalytica, Inc. and Tanaka Kikinzoku Kogyo and has been described in recent publications (Dalla Betta, et al., 1994). This technology is applicable to a wide range of



XONON

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CATALYTICA OVERVIEW

CATALYTICA, INC.

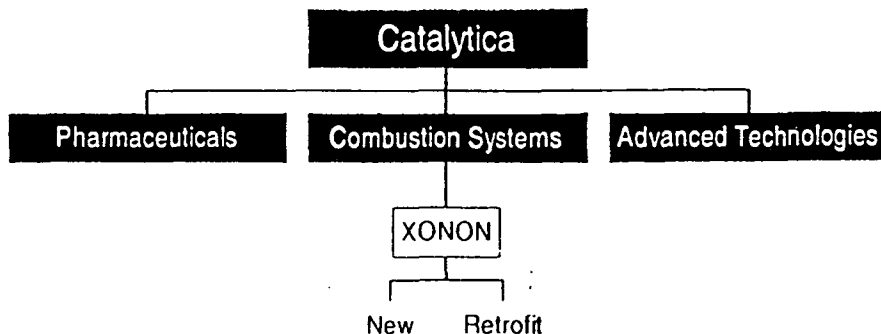
Catalytica, Inc. (NASDAQ: CTAL) builds businesses in high growth industries where the Company's technologies optimize manufacturing and solve environmental problems. In addition to Catalytica Combustion Systems, Inc., Catalytica Pharmaceuticals, Inc. provides drug development and product manufacturing to the pharmaceutical industry and Catalytica Advanced Technologies, Inc. serves as an incubator for new catalytic technologies for industrial applications. Catalytica has a market capitalization of about \$800 million and 1,400 employees.

Find Catalytica on the worldwide web at: www.catalytica-inc.com

CATALYTICA COMBUSTION SYSTEMS, INC.

Catalytica Combustion Systems (CCSI) develops and manufactures advanced combustion systems for gas turbines, based upon the breakthrough technology called XONON™ (pronounced Zo-non). The XONON Combustion System reduces NOx emissions from gas turbines to less than 3 ppm and offers the most economic and efficient alter-native to reduce emissions without impacting turbine performance.

The first commercial installation of a gas turbine with XONON has begun at Silicon Valley Power in Santa Clara, California. Performance results will be reported periodically on the Caltaytica webpage.



Catalytica Combustion Systems, Inc.

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Author: mark.dvorscak@ch.doe.gov_at_INTERNET at X400PO
Date: 7/14/1999 12:34 PM
Priority: Normal
TO: KATHERINE BALDWIN at GC-02
Subject: Request for Advanced Waiver Number

----- Message Contents -----

Hi Katie,

When you have a chance, can you send me an Advanced Waiver number? The particulars are as follows:

Receipt Date in Field Office: July 6, 1999
Petitioner: Catalytica Combustion Systems, Inc.

Subject: Development of catalytic combustion technology that is to be incorporated in the (Advanced Turbine System (ATS) program

Contract Number for this Waiver: currently unknown

If contract number is for a sub, please complete the following:

Prime Contract Number: DE-FC21-96MC33066
Prime Contractor Name: Allison Rolls Royce

Subcontract Number: Unknown
Subcontractor Name: Catalytica Combustion Systems, Inc.

Thanks!
Mark

✓(A) - 99 - 012

SEP - 1 1999

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies
EE-23 5F059/FORS

SUBJECT: REQUEST BY CATALYTICA COMBUSTION SYSTEMS, INC. FOR AN
ADVANCE WAIVER OF DOMESTIC AND FOREIGN INVENTION RIGHTS
UNDER A SUBCONTRACT WITH ALLISON ENGINE COMPANY (ALLISON)
UNDER DOE COOPERATIVE AGREEMENT NO. DE-FC21-96MC33066;
W(A)-99-012, CH-1006

Enclosed are a Statement of Considerations and a Waiver Petition for the subject waiver request recommending grant of the requested waiver. The reasons supporting this recommendation are set forth fully in the Statement of Considerations.

Please signify your concurrence by signing the attached Statement of Considerations and returning it to this office.

Paul A. Gottlieb
Assistant General Counsel
for Tech Transfer and Intellectual Property

Enclosures:
As Stated

STATEMENT OF CONSIDERATIONS

Request by Catalytica Combustion Systems, Inc. for an Advance Waiver of Domestic and Foreign Invention Rights under a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066; W(A)-99-012, CH-1006

The Petitioner, Catalytica Combustion Systems, Inc. (Catalytica), intends to enter into a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066. Under the cooperative agreement, entitled "Industrial Advanced Turbine Systems (ATS) Development and Design", Allison is to develop natural gas fired ATS suitable for cogeneration or mechanical drive applications in industrial markets. This cooperative agreement is under the ATS program initiated by the Department of Energy to serve industrial power generation markets. Under the proposed subcontract, Catalytica will design, test, and support Allison for the development of pre-competitive data as it relates to catalytic combustion technology that is to be incorporated in the ATS program. Further details for fulfilling these objectives are described in Catalytica's response to question 2 of the attached waiver petition, along with a copy of the Statement of Work from the cooperative agreement with Allison. Catalytica has requested a waiver of domestic and foreign rights for all subject inventions under its proposed subcontract with Allison. Allison has not requested an advance waiver under its cooperative agreement with DOE.

The total estimated cost of the subcontract is about \$1,043,062. Cost sharing of the project includes Catalytica's cost share of about \$365,072, or about 35%. The remaining cost share of the subcontract is provided through Allison's prime contract with DOE. It is anticipated that the length of this subcontract will be fourteen months.

In its response to questions 4 and 5 of the attached waiver petition, Catalytica has shown significant technical competence in developing technologies that further advance the art and science of catalytic combustion for gas turbines. Since 1988, it has developed and demonstrated the basic technology for the catalyst system, low NOx preburner, fuel-air mixing, control system, and mechanical support structures. This has been accomplished by the use of analytical modeling and rig testing, and is documented by the numerous patents and technical papers. Catalytica has collaborated with manufacturers in both the utility power generation and industrial applications markets such as General Electric, Solar Turbines, Pratt and Whitney Canada, and Allison Rolls Royce, and through these collaborations Catalytica is developing products based on catalytic combustion technology for introduction into the marketplace by the year 2002.

As indicated in response to questions 6 and 7, Catalytica has committed to the commercialization of catalytic combustion systems, and has invested over 30 million dollars in the technology and toward its eventual commercialization. Its goal is to expand the application range of catalytic combustion and to optimize the catalytic combustion system for the targeted market. A representative list of patents and publications, along with informational material describing the petitioner's combustion system, XOXON™, are attached to the waiver petition.

From its response to question 9, Catalytica indicates that there would be no effect on competition and market concentration by grant of the waiver because of expected competition with General Electric, Allison Rolls Royce and Solar Turbines. Catalytica states that since the market does not currently include a catalytic combustion option, the grant of the waiver will support an increase in competitive low NOx solutions.

The subject cooperative agreement will be modified to add the Patent Rights--Waiver clause in conformance with 10 CFR 784.12. This waiver clause will also include a paragraph entitled U.S. Competitiveness, in which Catalytica agrees to substantial U. S. manufacture of subject inventions (attached hereto). Additionally, Catalytica agrees not to transfer subject inventions to any other entity unless that other entity agrees to these same requirements. The petitioner has further agreed to modification of the data clause of the subject cooperative agreement (48 C.F.R. 952.227-14) by adding paragraph (k), Alternative VI, concerning contractor licensing of data.

Considering the foregoing, it is believed that granting the waiver will provide the Petitioner with the

necessary incentive to invest resources in the commercialization of the results of the agreement in a fashion which will make the agreement's benefits available to the public in the shortest practicable time. In addition, it would appear that grant of the above requested waiver would not result in an adverse effect on competition nor result in excessive market concentration. Therefore, in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver, as set forth above, be granted.



Mark P. Dvorscak
Assistant Chief Counsel
Office of Intellectual Property Law

Date Aug 30/1999

Based on the foregoing Statement of Considerations and the representations in the attached waiver petition, it is determined that the United States and the general public will best be served by a waiver of rights and consent to assignment of the scope described above, and therefore the waiver is granted. This waiver shall not apply to any modification or extension of this agreement, where through such modification or extension, the purpose, scope, or cost of the agreement is substantially altered.

CONCURRENCE:

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies

Date: _____

APPROVAL:

Paul A. Gottlieb
Assistant General Counsel
for Technology Transfer
and Intellectual Property

Date: _____

(i) **U. S. COMPETITIVENESS** The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.



Department of Energy
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

July 15, 1999

Paul A. Gottlieb
Assistant General Counsel
for Technology Transfer and
Intellectual Property, HQ
GC-62 6F-067/FORS

SUBJECT: REQUEST BY CATALYTICA COMBUSTION SYSTEMS, INC. FOR AN
ADVANCE WAIVER OF DOMESTIC AND FOREIGN INVENTION RIGHTS
UNDER A SUBCONTRACT WITH ALLISON ENGINE COMPANY (ALLISON)
UNDER DOE COOPERATIVE AGREEMENT NO. DE-FC21-96MC33066;
W(A)-99-012, CH-1006

Enclosed are a transmittal memo, a Statement of Considerations and Waiver Petition for the subject waiver request. The reasons supporting this recommendation are set forth fully in the Statement of Considerations.

It is understood that the Program Office will support the waiver request.

A handwritten signature in black ink, reading "Mark P. Dvorscak", is positioned above the typed name.

Mark P. Dvorscak
Assistant Chief Counsel
Office of Intellectual Property Law

Enclosures:

1. Transmittal Memo (2)
2. Statement of Considerations (3)
3. Waiver Petition (3)

STATEMENT OF CONSIDERATIONS

Request by Catalytica Combustion Systems, Inc. for an Advance Waiver of Domestic and Foreign Invention Rights under a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066; W(A)-99-012, CH-1006

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The total estimated cost of the subcontract is about \$1,043,062. Cost sharing of the project includes Catalytica's cost share of about \$365,072, or about 35%. The remaining cost share of the subcontract is provided through Allison's prime contract with DOE. It is anticipated that the length of this subcontract will be fourteen months.

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From its response to question 9, Catalytica indicates that there would be no effect on competition and market concentration by grant of the waiver because of expected competition with General Electric, Allison Rolls Royce and Solar Turbines. Catalytica states that since the market does not currently include a catalytic combustion option, the grant of the waiver will support an increase in competitive low NOx solutions.

The Petitioner has agreed to the standard provisions with respect to invention waivers with the substitution of the march in rights, U.S. manufacturing preference and U.S. government license provided in 35 U.S.C. 202-204. Additionally, Catalytica has accepted standard background patent and data provisions of paragraphs (k) to assure commercialization of the technology.

The subject cooperative agreement will be modified to add the Patent Rights--Waiver clause in conformance with 10 CFR 784.12. This waiver clause will also include a paragraph entitled U.S. Competitiveness, in which Catalytica agrees to substantial U. S. manufacture of subject inventions (attached hereto). Additionally, Catalytica agrees not to transfer subject inventions to any other entity unless that other entity agrees to these same requirements.

Considering the foregoing, it is believed that granting the waiver will provide the Petitioner with the necessary incentive to invest resources in the commercialization of the results of the agreement in a fashion which will make the agreement's benefits available to the public in the shortest practicable time. In addition, it would appear that grant of the above requested waiver would not result in an adverse effect on competition nor result in excessive market concentration. Therefore, in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver, as set forth above, be granted.



Mark P. Dvorscak
Assistant Chief Counsel
Office of Intellectual Property Law

Date July 15, 1999

Based on the foregoing Statement of Considerations and the representations in the attached waiver petition, it is determined that the United States and the general public will best be served by a waiver of rights and consent to assignment of the scope described above, and therefore the waiver is granted. This waiver shall not apply to any modification or extension of this agreement, where through such modification or extension, the purpose, scope, or cost of the agreement is substantially altered.

CONCURRENCE:

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies

Date _____

APPROVAL:

Paul A. Gottlieb
Assistant General Counsel
for Technology Transfer and
Intellectual Property

Date _____

(t) U. S. COMPETITIVENESS The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.



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June 30, 1999

MEMORANDUM FOR MARK DVORSCAK
ASSISTANT CHIEF COUNSEL

FROM: LISA A. JARR *Lisa A. Jarr*
PATENT COUNSEL

SUBJECT: Transmission of DOE/FETC Sub-Contractor Advance Patent Waiver
Petition -- DE-FC21-96MC33066

By this memo I am transmitting an advance patent waiver petition submitted by Catalytica in anticipation of entering into a subcontract with Rolls Royce Allison under the subject cooperative agreement. I have also sent Mr. Jecminek a copy of our standard advance patent waiver clause but I have not received any indication that it is acceptable to Catalytica.

Catalytica is unwilling to perform the subcontract unless they get the advance patent waiver. However, it is critical to the program to initiate this work as soon as possible. I spoke to Paul Gottlieb about getting advance approval and he said that he would consider that option but would prefer to not do so since we have been processing these petitions quickly. Thus, we would appreciate it if you would assign a high priority to this waiver petition.

Please provide me with the waiver numbers once assigned.

Attachments

UNITED STATES
DEPARTMENT OF ENERGY

PETITION FOR ADVANCE WAIVER OF PATENT
RIGHTS UNDER 10 CFR § 784

TO BE COMPLETED BY DOE:

HQ WAIVER NO.: _____

CH WAIVER NO.: _____

Title of Contract or Proposal Solar Turbines Incorporated / Rolls-Royce Allison
Joint Combustion Development with Catalytica Combustion Systems, Inc.
RFP No. 990122JCD Contract No. and Date (If executed) _____

The Catalytica Combustion Systems, Inc., 430 Ferguson Drive, Mountain View,
California 94043-5272

(Name and address of Petitioner)

does hereby petition the Secretary of the Department of Energy for waiver of patent rights of the United States of America to any invention(s) that may be made in the performance of work under the above-identified contract. It is understood that any waiver of rights shall be subject to the conditions set forth in 10 CFR § 784.

Is Contractor a small business as defined by 1-1.701 FPR? No

In support of this petition, answers to the following questions are submitted as an appendix hereto.

1. If this petition is for a waiver of rights other than domestic and foreign patent rights, describe the exact scope of the waiver requested.
2. Give a brief description of the scope of work of the above contract.
3. What is the dollar amount and period of performance of this contract?
4. Briefly describe Contractor's technical competence in the field of technology covered by the scope of work of this contract in terms of prior experience, know-how and patent position. (Attach exhibits to substantiate your technical competence, e.g., patents, technical publications, etc. If these are voluminous a representative sample is sufficient.)

A

5. Briefly describe the Contractor's established commercial position in the field covered by the scope of work of the above contract. (Discuss in terms of selling goods or providing services in such field and in terms of market share where there is an existing market related to the contract work. Identify the proportion of sales to the Government. Attach exhibits to substantiate your commercial position. e.g., sales brochures, etc. If these are voluminous, a representative sample is sufficient.)
6. What is the financial or other investment that has been made by Contractor directly related to the work to be performed under this contract?
7. To what extent will the Contractor make a substantial investment or effort which will directly benefit the work to be performed under the contract?
8. Why will the grant of the above-requested waiver more effectively promote the commercial utilization of any invention made under this contract?
9. What will be the effect on competition and market concentration if the above-requested waiver is granted? Would the acquisition of the waiver rights requested be likely to place Contractor in a preferred or dominant position in this field? Give reasons for your conclusions.
10. What other contracts has Contractor had with any Branch or Agency of the U.S. Government which include all or a part of the scope of work covered by this contract?
11. Is Contractor aware of any governmental regulations which require or which might require the use of the contract subject matter by the general public or a segment thereof? (If yes, explain.)
12. Does the work under this contract require an exploration into fields which concern the public health, safety or welfare; (for example, the development of drugs, medical or safety instruments, anti-pollution devices or such other products that may have a bearing on health, safety or welfare of the general public)? (If yes, explain.)
13. If Contractor is a nonprofit educational institution, what is the technology transfer capability and program of Contractor? Has this technology transfer capability and program been approved by DOE or any other agency?
14. Give any other facts that Contractor believes will establish that the interests of the United States and the general public will best be served by the granting of this waiver. Sufficient information is required so that the Secretary can consider specifically each of the areas and objectives covered in 10 CFR § 784.
15. (a) Have you within the past 6 months assigned or conveyed an interest to a party other than DOE in any patent or patent application covering a subject of the

Catalytica Combustion Systems, Inc., U.S. Patent Rights on Catalytic Combustion

Reference No.	Title	Patent or Patent Application No.
P-1032	Graded Palladium-Containing Partial Combustion Catalyst	5,258,349
P-1032A	Graded Palladium-Containing Partial Combustion Catalyst and a Process for Using It	5,248,251
P-1033	Catalyst Structure Having Integral Heat Exchange	5,250,489
P-1034	Partial Combustion Process and a Catalyst Structure for Use in the Process	5,326,253
P-1034O	Partial Combustion Process and Catalyst Structure for Use in the Process	5,511,972
P-1035N	Process for Burning Combustible Mixtures	5,425,632
P-1036	Multistage Process for Combusting Fuel Mixtures	5,281,128

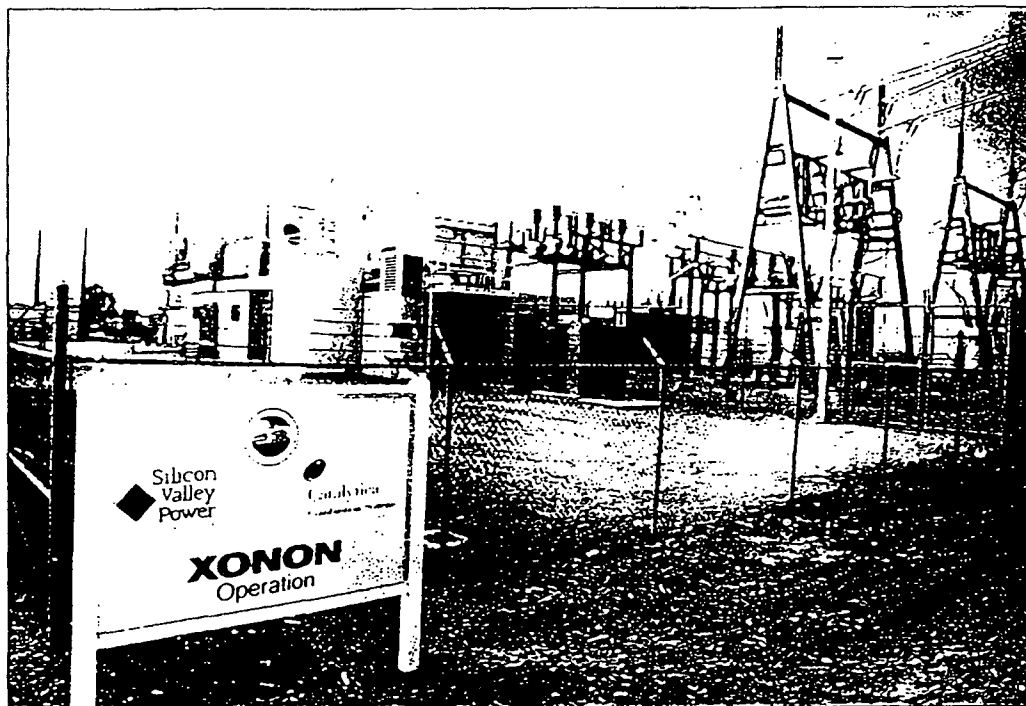
Reference No.	Title	Patent or Patent Application No.
P-1037	Partial Combustion Catalyst of Palladium on a Zirconia Support and a Process for Using It	5,259,754
P-1037N	Partial Combustion Catalyst of Palladium on a Zirconia Support and a Process for Using It	5,405,260
P-1038	Multistage Process for Combusting Fuel Mixtures Using Oxide Catalysts in the Hot Stage	5,232,357
P-1040	Two-stage Process for Combusting Fuel Mixtures	5,183,401
P-1065	Cooled Support Structure for a Catalyst	5,461,864
P-1070	Catalyst Structure Employing Integral Heat Exchange	5,512,250
P-1070G	Process and Catalyst Structure Employing Integral Heat Exchange with Optional Downstream Flameholder	5,518,697
P-1070N	Process and Catalyst Structure Employing Integral Heat Exchange with Optional Downstream Flameholder	08/668,615

Reference No.	Title	Patent or Patent Application No.
P-1073	Catalyst Support for High Temperature Applications and Catalysts and Catalytic Processes Employing Same	08/507,953
P-1074	Support Structure for a Catalyst	08/462,639
P-1077	Electrically-Heated Combustion Catalyst Structure and Method for Start-up of a Gas Turbine	08/688,075
P-1081	Improved Support Structures for a Catalyst	09/070,443

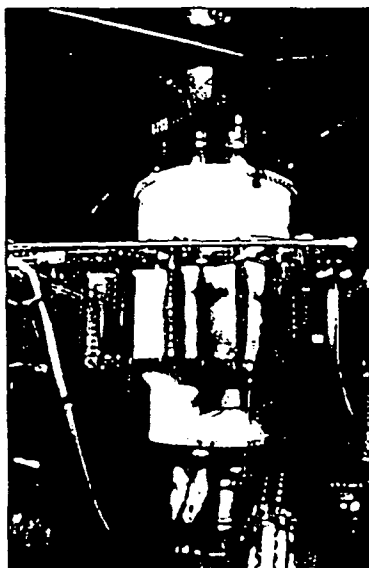


Catalytica
Combustion Systems

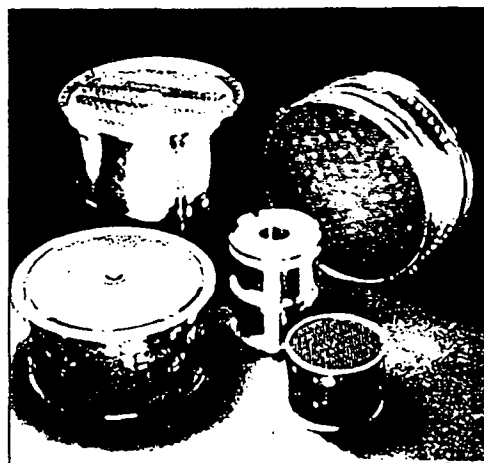
The XONON™ Combustion System at Silicon Valley Power



The first commercial installation of XONON at Silicon Valley Power, a municipally owned electric utility in Santa Clara, California



The XONON-2 beta version of commercial combustor installed at Silicon Valley Power



The XONON family of catalyst modules for Kawasaki, GE, Rolls Royce, and Pratt & Whitney gas turbines

Tests of catalytic-combustion technology show low emissions

L. Charles Solt, James C. Schlatter / Catalytic Combustion Systems Inc., Mountain View, Calif.

Turbine-inlet temperatures of 1,900-2,000° F are required to produce energy, depending upon the turbine design. Combustion of fuels, however, occurs at temperatures greater than 2,800° F.

At these temperatures nitrogen and oxygen combine to produce nitrous oxide (NO_x), a U.S. Environmental Protection Agency criteria pollutant that contributes to the formation of ozone.

Impact on natural-gas pipeline operations

Because gas turbines are used to drive compressors, NO_x regulations will also affect pipeline operators. Specifically, there are two federal programs under development that will significantly impact both existing and new gas turbine pipeline compression stations:

- Ozone Transport Assessment Group (OTAG) has recommended regulatory changes to prevent attainment areas from negatively impacting downwind non-attainment areas.

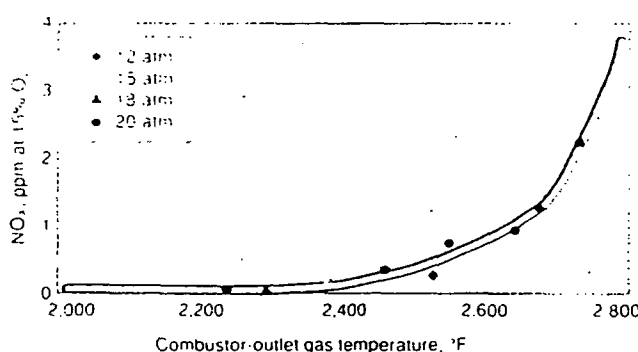
- National Ambient Air Quality Standards revisions signed by President Clinton last June will tighten the standards for ozone and particulate matter.

Pipeline companies would, therefore, be well advised to consider technologies now that will mitigate the impact of these impending regulations.

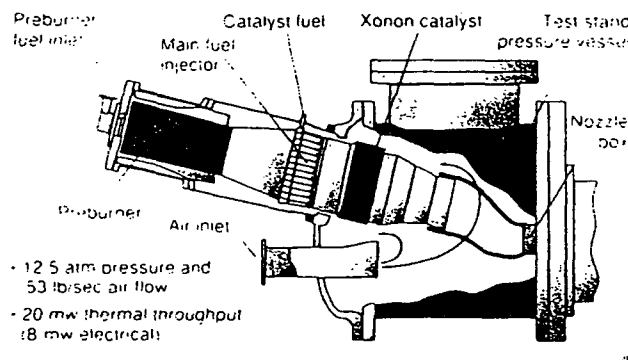
A flameless, catalytic combustion process, Xonon, developed by Catalytic Combustion Systems Inc. (CCSI), Mountain View, Calif., combusts fuels at less than 2,400° F.

Two full-scale tests and another on an actual turbine in the field have indicated that

XONON IMPACT ON NO_x FORMATION



GE 7/9 EA FULL-SCALE XONON COMBUSTOR



Xonon consistently achieves NO_x emissions of <3 ppm while maintaining optimum operating conditions in the turbine.

In November 1996, CCSI received its first commercial contract for Xonon when the City of Glendale, Calif., agreed to retrofit a Pratt & Whitney FT-4 turbine with Xonon at its Grayson power plant. The system will be delivered in early 1999.

GE announced its intent in June 1997 to market the Xonon system to its installed base of gas turbines worldwide. In December 1997, Enten Ventures Corp. announced it will invest \$30 million to help ac-

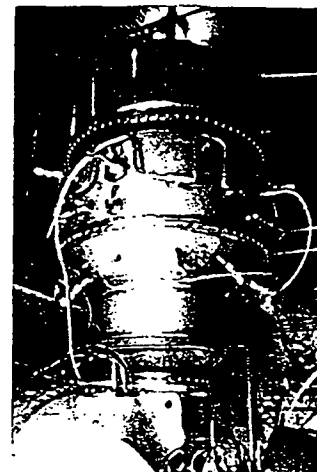
celerate Xonon's commercialization.

NO_x -control technologies

The amount of NO_x produced in a combustion process depends on the maximum temperature attained at any point in the combustor and on the total time at this temperature (Fig. 1).

A typical gas-turbine combustor would have a gas residence time in the range of 10-100 ms, depending upon the combustor design. To minimize NO_x formation it is necessary to reduce the average temperature of the combustor and to eliminate hot spots.

Hot spots are small regions



Full-scale testing of the Xonon emissions-reducing combustion technology continues on a Kawasaki M1A-13A engine in Tulsa. The engine has achieved more than 1,100 operating hr and 220 cycles of start-up/shutdown (Fig. 3).

where a high fuel/air ratio results in high local temperatures. Eliminating them eliminates the major cause of high NO_x levels, as shown by the rapid rise in NO_x level as the temperature increases.

During the last 20 years, scientists have been working to develop technologies that reduce NO_x emissions while maintaining optimum temperatures and turbine performance. Standard diffusion-flame combustors produce NO_x in a range of 400-200 ppm, levels prohibited under current U.S. federal and state regulations.

Dry controls, in which more air is used in the primary combustion zone than is necessary to burn all the fuel, were initially used to lower the peak temperature and reduce NO_x formation. But these reduced NO_x by only 10-20%.

Wet controls, in which water or steam is injected into



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THE ULTIMATE NO_x SOLUTION FOR GAS TURBINES

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www.catalytica-inc.com

ABSTRACT

Since the introduction of emission standards for gas turbines in the late '70s and early '80s, the gas turbine industry has responded with a variety of combustion and cleanup alternatives that have improved emissions. While the emissions were being reduced, the cost of control, and the negative environmental impacts were often significant.

Thanks to a technological breakthrough, catalytic combustion has now been achieved, and can fulfill the promise of low cost NO_x elimination without the high cost of SCR or the operational problems associated with Lean Pre-Mix.

NO_x Formation

NO_x is composed of oxygen and nitrogen, so the air entering the engine, consisting of 21% oxygen and 79% nitrogen, contains all the ingredients necessary to produce this pollutant. The only additional factor that is required is a temperature high enough to cause oxygen and nitrogen to combine (see Fig 1). Turbine manufacturers try to prevent the formation of NO_x primarily by reducing the peak flame temperature below the range in which NO_x is formed.

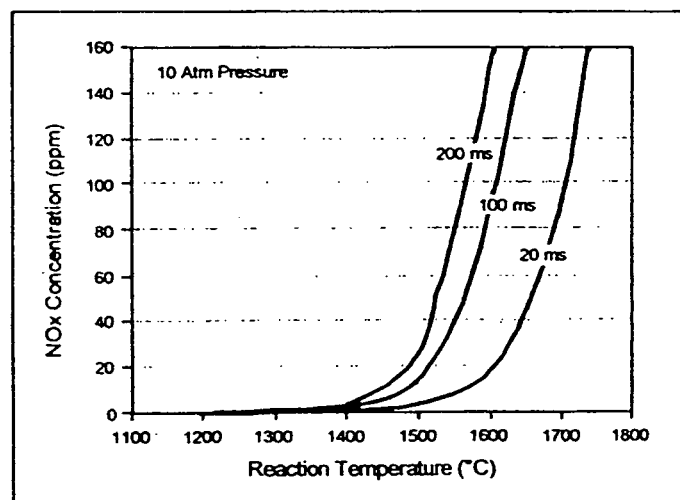


Figure 1. NO_x Formation as a function of Time and Temperature

Diffusion Flame Combustion

Before the concern about NO_x emissions arose, gas turbine manufacturers primarily aimed at building a rugged, long-life combustor with a good temperature distribution, reliable light-off, and which would not flame out under transient load conditions. To achieve these design goals it was helpful to burn the fuel under conditions that were very close to stoichiometric, that is, conditions where there is just enough oxygen to burn all of the fuel. Under



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SINGLE-DIGIT EMISSIONS IN A FULL SCALE CATALYTIC COMBUSTOR

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ABSTRACT

Catalytic combustion offers the possibility of attaining the firing temperatures of current and next generation gas turbines [up to -1450°C (2640°F)] with nitrogen oxides (NO_x) production as low as 1 part per million by volume (ppmv). Such catalytic combustion technology has been under development at Catalytica for several years, and the first full scale test of the technology took place at the General Electric Company under TEPCO sponsorship in 1992. The results of the most recent and most successful full scale test in this program are reported in this paper.

The catalytic combustor system was designed for the GE Model MS9001E gas turbine fired with natural gas fuel. The 508-mm (20-in) diameter catalytic reactor was operated at conditions representative of the startup and load cycle of that machine. It was verified that the observed NO_x levels were produced not in the catalyst, but in the diffusion flame of the preburner used to start the system and maintain the necessary catalyst inlet temperature. Even so, NO_x levels below 5 ppmv (at 15% O_2) were achieved at the simulated base load operating point. Carbon monoxide (CO) and unburned hydrocarbons (UHC) emissions were likewise below 10 ppmv at that condition. Single digit emissions levels also were recorded at conditions representative of the combustor operating at 78% load, the first such demonstration of the turndown capability of this system. Throughout the test, dynamic pressure measurements showed the catalytic combustor to be quieter than even the diffusion flame combustors currently in commercial service.

INTRODUCTION

The technologies currently practiced for controlling NO_x emissions from heavy-duty industrial gas turbines involve either diluent injection into the combustor reaction zone or lean premixed combustion. To meet increasingly stringent emissions regulations,

many turbine installations must also include a selective catalytic reduction (SCR) unit on the exhaust stream to remove NO_x produced in the combustor.

GE has commercialized Dry Low NO_x (DLN) systems based upon lean premixed combustion technology to deliver NO_x emissions levels of 15-20 ppmv in existing power plants. [All NO_x concentrations shown in this paper are corrected to 15% O_2]. The latest versions of the DLN systems are designed for 9 ppmv. At single digit NO_x levels, however, lean premixed systems are being pushed to the limits of flame stability; and this may preclude further significant reductions in NO_x emissions via this approach. Thus there is an incentive to develop a new generation of combustion systems that can achieve NO_x levels of 3-5 ppmv without incurring the capital and operating costs associated with diluent injection and SCR systems.

NO_x production in a gas turbine combustor occurs predominantly within the flame zone, where localized high temperatures sustain the NO_x -forming reactions. The overall average gas temperature required to drive the turbine is well below the flame temperature, but the flame region is required to achieve stable combustion. Because catalytic combustion offers the possibility of achieving full conversion of a fuel/air mixture without the presence of a flame and its associated NO_x formation reactions, it offers the potential for delivering ultra-low NO_x levels without the need for SCR or other exhaust after-treatment.

This potential of catalytic combustion has been recognized for 20 years (Pfefferle, 1975), but the environment in a gas turbine combustor presents significant challenges for a catalyst. The gas temperature required at the combustor exit ranges from 1175°C to 1500°C (2150°F to 2730°F), depending upon the particular turbine design. Such temperatures are well above the stability limits of most catalytic materials. Even ceramics that can survive the combustor temperatures are susceptible to thermal shock failure

¹ Currently at Catalytica Combustion Systems, Inc.



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DEVELOPMENT OF A CATALYTIC COMBUSTOR FOR A HEAVY-DUTY UTILITY GAS TURBINE

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ABSTRACT

The most effective technologies currently available for controlling NO_x emissions from heavy-duty industrial gas turbines are either diluent injection in the combustor reaction zone, or lean premixed Dry Low NO_x (DLN) combustion. For ultra low emissions requirements, these must be combined with selective catalytic reduction (SCR) DeNO_x systems in the gas turbine exhaust. An alternative technology for achieving comparable emissions levels with the potential for lower capital investment and operating cost is catalytic combustion of lean premixed fuel and air within the gas turbine. The design of a catalytic combustion system using natural gas fuel has been prepared for the GE model MS9001E gas turbine. This machine has a turbine inlet temperature to the first rotating stage of over 1100°C and produces approximately 105 MW electrical output in simple cycle operation. The 508 mm diameter catalytic combustor designed for this gas turbine was operated at full-scale conditions in tests conducted in 1992 and 1994. The combustor was operated for twelve hours during the 1994 test and demonstrated very low NO_x emissions from the catalytic reactor. The total exhaust NO_x level was approximately 12-15 ppmv and was produced almost entirely in the preburner ahead of the reactor. A small quantity of steam injected into the preburner reduced the NO_x emissions to 5-6 ppmv.

Development of the combustion system has continued with the objectives of reducing CO and UHC emissions, understanding the parameters affecting reactor stability and spatial non-uniformities which were observed at low inlet temperature, and improving the structural integrity of the reactor system to a level required for commercial operation of gas turbines. Design modifications were completed and combustion hardware was fabricated for additional full-scale tests of the catalytic combustion system in March 1995 and January 1996. This paper presents a discussion of the combustor design, the catalytic reactor design and the results of full-scale testing of the improved combustor at MS9001E cycle conditions in the March 1995 and January 1996 tests. Major improvements in performance were achieved with CO and UHC emissions of 10 ppmv and 0 ppmv at base load conditions.

This ongoing program will lead to two additional full-scale combustion system tests in 1996. The results of these tests will be available for discussion at the June 1996 Conference in Birmingham.

NOMENCLATURE

CO = Carbon monoxide emissions
DLN = Dry Low NO_x
FSNL = Full Speed No Load
ISO = International Standards Organization
MVT = Multiple Venturi Tube type fuel injector
MWe = Megawatts electrical output
NO_x = Oxides of nitrogen emissions
ppm = Parts Per Million by volume
SCR = Selective catalytic reduction
UHC = Unburned Hydrocarbon emissions

INTRODUCTION

Trends in environmental regulations are necessitating use of clean burning fuels (particularly natural gas), advanced gas turbine combustion systems which reduce the amount of NO_x formed during the combustion process and, where emissions regulations are at the single-digit NO_x levels, use of Selective Catalytic Reduction (SCR) of the NO_x in the gas turbine exhaust. An example is California where NO_x levels of newly constructed combined cycle plants are regulated to as low as 5 ppm (at 15% O₂).

Consequently, the incentive now exists for development of a new generation of combustion systems capable of meeting NO_x emissions levels of approximately 3-5 ppm, directly within the turbine, without recourse to downstream denitrification by SCR in the turbine exhaust. This new generation of combustion systems should be suitable for turbines firing at today's turbine inlet temperatures of approximately 1290°C (at the inlet of the first stage rotor), with growth potential to the next generation of turbines expected to fire at approximately 1427°C. The costs associated with heat rate deterioration due to diluent injection, combined with capital and operating costs required for SCR systems, provides substantial economic incentive to develop ultra-low NO_x combustion systems for application to combined cycle and cogeneration power plants incorporating gas turbines.

Direct catalytic combustion has significant potential, as demonstrated by tests performed at GE for natural gas fuel with very low emissions of NO_x, CO and UHC. A promising concept for the catalytic combustion of natural gas has been developed by Catalytica/Tanaka Kikinzoku Kogyo K.K. In general terms, the design involves partially reacting the fuel-air mixture within the catalytic reactor to generate a gas temperature of

Presented at the International Gas Turbine and Aeroengine Congress & Exhibition
Birmingham, UK — June 10-13, 1996

This paper has been accepted for publication in the Transactions of the ASME
Discussion of it will be accepted at ASME Headquarters until September 30, 1996



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DESIGN AND EVALUATION OF A SINGLE-CAN FULL SCALE CATALYTIC COMBUSTION SYSTEM FOR ULTRA-LOW EMISSIONS INDUSTRIAL GAS TURBINES

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Solar Turbines Incorporated
San Diego, California.

D. K. Yee and R. A. Dalla Betta
Catalytica Inc.
Mountain View, California

ABSTRACT

The goal of the Advanced Turbine Systems (ATS) program is the design and development of high thermal efficiency gas turbines with pollutant emissions at single digit levels, through the development of advanced recuperated gas turbines. Following successful subscale catalytic reactor testing, a full scale catalytic combustion system was designed to be representative of a single can in a multi-can gas turbine combustor configuration. The full scale catalytic combustion system is modular in design and includes a fuel/air premixer upstream of the catalytic reactor and a post catalyst homogeneous combustion zone downstream of the catalyst bed to complete the homogeneous gas-phase reactions. System start-up is accomplished using a lean-premixed (LP) low emissions fuel injector. The system transitions to catalyst operation using a variable geometry valve that diverts air flow into the catalyst at loads greater than 50% of full load. The variable geometry valve is used to operate the catalyst within the narrow operating window due to limited fuel/air turndown allowed by the catalyst. A catalyst design with preferential catalyst coating on a corrugated metal substrate to limit catalyst substrate temperatures was selected for the system. Mean fuel concentration measurements at the inlet to the catalyst bed using an instrumented catalyst module showed the fuel/air premixing to be within catalyst specifications. Preliminary combustion tests on the system were completed. The catalytic combustion system was tested over the 50-to-100% load range. Using variable geometry control, emissions goals (< 5 ppmv NO_x, < 10 ppmv CO and UHC corrected to 15% O₂) were achieved for catalyst operation between 50-and-100% load conditions. The system was started and operated under part-load conditions using the LP injector. Efforts are under way to accomplish successful transition from LP mode of operation to catalytic mode of operation using the variable geometry system.

INTRODUCTION

The goal of the Advanced Turbine Systems (ATS) program is the design and development of high thermal efficiency gas turbines with NO_x emissions at single digit levels over the 50 to 100% load range, while achieving high thermal efficiency, through the development of advanced recuperated gas turbines. Catalytic combustion was selected as an approach

capable of attaining the emissions goals of the ATS gas turbines. Initial work focused on the subscale evaluation of catalytic reactors under simulated gas turbine conditions, and the results from the subscale development tests have been reported elsewhere (Topical Report, 1996). Following successful subscale catalytic reactor testing, a full-scale catalytic combustion system representative of a single can in a multi-can gas turbine combustor configuration was designed. On successful evaluation of this catalytic combustion system, a full set of hardware will be procured for an engine demonstration. This paper discusses the concept and design of a full scale catalytic combustion system and preliminary test results from rig testing at simulated gas turbine conditions.

BACKGROUND

Catalytic combustion is a lean-premixed combustion process where a catalyst is used to initiate and promote chemical reactions in a premixed fuel-air mixture at leaner conditions than are possible in homogeneous gas-phase combustion. This allows stable combustion of lean fuel/air mixtures with adiabatic combustion temperatures less than 1650 K, so that NO_x emissions less than 5 ppmv can be achieved.

Even though the concept of catalytically stabilized combustion was demonstrated in the early '70s (Pfefferle, 1975), the technology has not yet been applied to field gas turbine combustors. During the initial development stages, materials issues related to high substrate temperatures, problems of sintering and deactivation of catalyst, and thermal shock resistance prevented the successful application of the technology in gas turbines. Recent development efforts are concentrated on innovative catalyst and system designs to circumvent the non-availability of reliable high temperature catalysts. There are currently three primary approaches to the design of catalytic combustion systems for gas turbine combustors: 1) systems using high temperature catalysts (e.g. Mn/Ba/La substituted hexaaluminates); 2) systems where only a part of the fuel is injected upstream of the catalyst (to limit catalyst temperatures) and the rest of the fuel is injected downstream of the catalyst (to obtain the desired temperature rise in the combustor); and 3) systems where all the fuel is injected upstream of the catalyst and partially reacted in the catalyst bed, and combustion is



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APPLICATION OF CATALYTIC COMBUSTION TECHNOLOGY TO INDUSTRIAL GAS TURBINES FOR ULTRA-LOW NO_x EMISSIONS

Ralph A. Dalla Betta, James C. Schlatter and Sorento G. Nickolas
Catalytica, Inc.
Mountain View, California

Mohan K. Razdan and Duane A. Smith
Allison Engine Company
Indianapolis, Indiana

ABSTRACT

An operating cycle had been developed for a catalytic combustion system applied to the Allison 501-KB7 engine. This cycle used overboard bleed of diffuser air to maintain a high fuel/air ratio at the catalyst and thus achieve a high combustor outlet temperature with attendant low CO and UHC emissions. For the design point of this engine, the emissions measured at full pressure and temperature in a subscale catalyst test rig were <1 ppm NO_x and <2 ppm CO and UHC. Tests over the full operating cycle showed that the catalytic combustor system would achieve low emissions from 20 to 100% load.

The use of catalytic combustion on a high efficiency gas turbine engine design was also evaluated. Pressures up to 20 atm and combustor outlet temperatures up to 1500°C (2730°F) were demonstrated with NO_x emissions <2.2 ppm and CO and UHC <2 ppm. These results show that catalytic combustion is a viable technology for application to a high pressure, high temperature industrial gas turbine engine design.

INTRODUCTION

Substantial past and present work is directed at reducing the NO_x emissions from gas turbine engines. This objective is driven by the increasingly stringent requirements imposed by regulatory agencies in ozone nonattainment areas, by Best Available Control Technology (BACT) determinations under the Prevention of Significant Deterioration (PSD) regulations for NO_x and under the Clean Air Act legislation.

The target emissions level for NO_x is <10 ppm and in many cases <5 ppm. Current technology to meet these targets requires the use of low NO_x combustor technology plus post exhaust treatment by selective catalytic reduction. This results in high capital and operating costs. Improved low cost emissions control technology is needed.

Most of the current dry low emissions approaches for industrial gas turbine engines are based on lean premixing of fuel and air and unique ways to stabilize combustion throughout the engine operating cycle (Razdan, et al., 1994; McLeroy, et al., 1995). There is, however, a lower limit to NO_x emissions achievable with conventional methods for combustion of lean premixed fuel/air mixtures. This is due to the fact that there is a lower limit to fuel/air equivalence ratio (about 0.5 for natural gas) below which combustion becomes unstable in practical gas turbine combustors. At very low fuel/air ratios, it is impossible to practically stabilize combustion with conventional methods such as recirculation through swirlers, transverse primary jets or bluff bodies. One technology that can stabilize the combustion of ultra-lean fuel/air mixtures is catalytically stabilized combustion. A catalyst can stabilize combustion at equivalence ratios substantially below 0.5, thus limiting the maximum temperature to less than the threshold of thermal NO_x production, approximately 1550°C (2820°F).

A new staged catalytic combustion technology has been developed by Catalytica, Inc. and Tanaka Kikinzoku Kogyo and has been described in recent publications (Dalla Betta, et al., 1994). This technology is applicable to a wide range of

CATALYTICA OVERVIEW

CATALYTICA, INC.

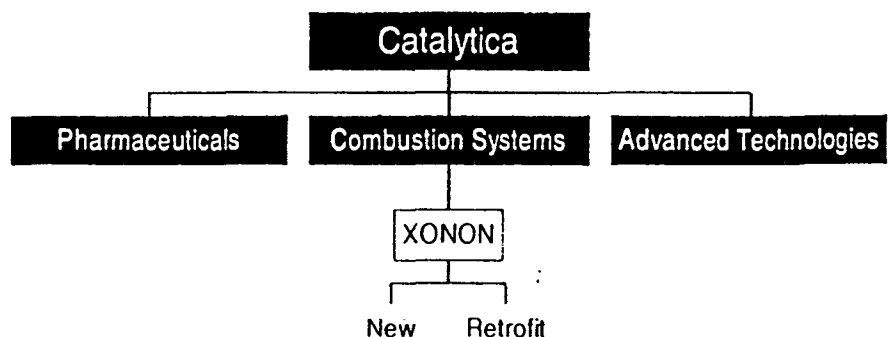
Catalytica, Inc. (NASDAQ: CTAL) builds businesses in high growth industries where the Company's technologies optimize manufacturing and solve environmental problems. In addition to Catalytica Combustion Systems, Inc., Catalytica Pharmaceuticals, Inc. provides drug development and product manufacturing to the pharmaceutical industry and Catalytica Advanced Technologies, Inc. serves as an incubator for new catalytic technologies for industrial applications. Catalytica has a market capitalization of about \$800 million and 1,400 employees.

Find Catalytica on the worldwide web at: www.catalytica-inc.com

CATALYTICA COMBUSTION SYSTEMS, INC.

Catalytica Combustion Systems (CCSI) develops and manufactures advanced combustion systems for gas turbines, based upon the breakthrough technology called XONON™ (pronounced Zo-non). The XONON Combustion System reduces NOx emissions from gas turbines to less than 3 ppm and offers the most economic and efficient alter-native to reduce emissions without impacting turbine performance.

The first commercial installation of a gas turbine with XONON has begun at Silicon Valley Power in Santa Clara, California. Performance results will be reported periodically on the Caltaytica webpage.



Catalytica Combustion Systems, Inc.

430 Ferguson Drive
Mountain View, CA 94043
650-940-6244

fax: 650-965-4345

www.catalytica-inc.com

XONON

It Works At 3ppm

STATEMENT OF CONSIDERATIONS

Request by Catalytica Combustion Systems, Inc. for an Advance Waiver of Domestic and Foreign Invention Rights under a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066; W(A)-99-012, CH-1006

The Petitioner, Catalytica Combustion Systems, Inc. (Catalytica), intends to enter into a subcontract with Allison Engine Company (Allison) under DOE Cooperative Agreement No. DE-FC21-96MC33066. Under the cooperative agreement, entitled "Industrial Advanced Turbine Systems (ATS) Development and Design", Allison is to develop natural gas fired ATS suitable for cogeneration or mechanical drive applications in industrial markets. This cooperative agreement is under the ATS program initiated by the Department of Energy to serve industrial power generation markets. Under the proposed subcontract, Catalytica will design, test, and support Allison for the development of pre-competitive data as it relates to catalytic combustion technology that is to be incorporated in the ATS program. Further details for fulfilling these objectives are described in Catalytica's response to question 2 of the attached waiver petition, along with a copy of the Statement of Work from the cooperative agreement with Allison. Catalytica has requested a waiver of domestic and foreign rights for all subject inventions under its proposed subcontract with Allison. Allison has not requested an advance waiver under its cooperative agreement with DOE.

The total estimated cost of the subcontract is about \$1,043,062. Cost sharing of the project includes Catalytica's cost share of about \$365,072, or about 35%. The remaining cost share of the subcontract is provided through Allison's prime contract with DOE. It is anticipated that the length of this subcontract will be fourteen months.

In its response to questions 4 and 5 of the attached waiver petition, Catalytica has shown significant technical competence in developing technologies that further advance the art and science of catalytic combustion for gas turbines. Since 1988, it has developed and demonstrated the basic technology for the catalyst system, low NOx preburner, fuel-air mixing, control system, and mechanical support structures. This has been accomplished by the use of analytical modeling and rig testing, and is documented by the numerous patents and technical papers. Catalytica has collaborated with manufacturers in both the utility power generation and industrial applications markets such as General Electric, Solar Turbines, Pratt and Whitney Canada, and Allison Rolls Royce, and through these collaborations Catalytica is developing products based on catalytic combustion technology for introduction into the marketplace by the year 2002.


As indicated in response to questions 6 and 7, Catalytica has committed to the commercialization of catalytic combustion systems, and has invested over 30 million dollars in the technology and toward its eventual commercialization. Its goal is to expand the application range of catalytic combustion and to optimize the catalytic combustion system for the targeted market. A representative list of patents and publications, along with informational material describing the petitioner's combustion system, XOXON™, are attached to the waiver petition.

From its response to question 9, Catalytica indicates that there would be no effect on competition and market concentration by grant of the waiver because of expected competition with General Electric, Allison Rolls Royce and Solar Turbines. Catalytica states that since the market does not currently include a catalytic combustion option, the grant of the waiver will support an increase in competitive low NOx solutions.

The Petitioner has agreed to the standard provisions with respect to invention waivers with the substitution of the march in rights, U.S. manufacturing preference and U.S. government license provided in 35 U.S.C. 202-204. Additionally, Catalytica has accepted standard background patent and data provisions of paragraphs (k) to assure commercialization of the technology.

The subject cooperative agreement will be modified to add the Patent Rights--Waiver clause in conformance with 10 CFR 784.12. This waiver clause will also include a paragraph entitled U.S. Competitiveness, in which Catalytica agrees to substantial U. S. manufacture of subject inventions (attached hereto). Additionally, Catalytica agrees not to transfer subject inventions to any other entity unless that other entity agrees to these same requirements.

Considering the foregoing, it is believed that granting the waiver will provide the Petitioner with the necessary incentive to invest resources in the commercialization of the results of the agreement in a fashion which will make the agreement's benefits available to the public in the shortest practicable time. In addition, it would appear that grant of the above requested waiver would not result in an adverse effect on competition nor result in excessive market concentration. Therefore, in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver, as set forth above, be granted.



Mark P. Dvorscak
Assistant Chief Counsel
Office of Intellectual Property Law

Date July 15, 1999

Based on the foregoing Statement of Considerations and the representations in the attached waiver petition, it is determined that the United States and the general public will best be served by a waiver of rights and consent to assignment of the scope described above, and therefore the waiver is granted. This waiver shall not apply to any modification or extension of this agreement, where through such modification or extension, the purpose, scope, or cost of the agreement is substantially altered.

CONCURRENCE:

Patricia Hoffman
Director, Advanced Turbine Systems
Office of Industrial Technologies

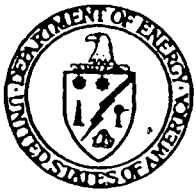
Date_____

APPROVAL:

Paul A. Gottlieb
Assistant General Counsel
for Technology Transfer and
Intellectual Property

Date_____

(t) U. S. COMPETITIVENESS The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.



U. S. Department of Energy
Federal Energy Technology Center

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940



June 30, 1999

MEMORANDUM FOR MARK DVORSCAK
ASSISTANT CHIEF COUNSEL

FROM: LISA A. JARR *Lisa A. Jarr*
PATENT COUNSEL

SUBJECT: Transmission of DOE/FETC Sub-Contractor Advance Patent Waiver
Petition -- DE-FC21-96MC33066

By this memo I am transmitting an advance patent waiver petition submitted by Catalytica in anticipation of entering into a subcontract with Rolls Royce Allison under the subject cooperative agreement. I have also sent Mr. Jecminek a copy of our standard advance patent waiver clause but I have not received any indication that it is acceptable to Catalytica.

Catalytica is unwilling to perform the subcontract unless they get the advance patent waiver. However, it is critical to the program to initiate this work as soon as possible. I spoke to Paul Gottlieb about getting advance approval and he said that he would consider that option but would prefer to not do so since we have been processing these petitions quickly. Thus, we would appreciate it if you would assign a high priority to this waiver petition.

Please provide me with the waiver numbers once assigned.

Attachments

46.

UNITED STATES
DEPARTMENT OF ENERGY

PETITION FOR ADVANCE WAIVER OF PATENT
RIGHTS UNDER 10 CFR § 784

TO BE COMPLETED BY DOE:
HQ WAIVER NO.: _____
CH WAIVER NO.: _____

Title of Contract or Proposal Solar Turbines Incorporated / Rolls-Royce Allison
Joint Combustion Development with Catalytica Combustion Systems, Inc
RFP No. 990122JCD Contract No. and Date (If executed) _____

The Catalytica Combustion Systems, Inc., 430 Ferguson Drive, Mountain View,
California 94043-5272

(Name and address of Petitioner)

does hereby petition the Secretary of the Department of Energy for waiver of patent rights of the United States of America to any invention(s) that may be made in the performance of work under the above-identified contract. It is understood that any waiver of rights shall be subject to the conditions set forth in 10 CFR § 784.

Is Contractor a small business as defined by 1-1.701 FPR? No

In support of this petition, answers to the following questions are submitted as an appendix hereto.

1. If this petition is for a waiver of rights other than domestic and foreign patent rights, describe the exact scope of the waiver requested.
2. Give a brief description of the scope of work of the above contract.
3. What is the dollar amount and period of performance of this contract?
4. Briefly describe Contractor's technical competence in the field of technology covered by the scope of work of this contract in terms of prior experience, know-how and patent position. (Attach exhibits to substantiate your technical competence, e.g., patents, technical publications, etc. If these are voluminous a representative sample is sufficient.)

Asamoah, Harvetta

From: Asamoah, Harvetta

Sent: Friday, July 05, 2002 11:31 AM

To: 'cbalassa@ustr.gov'; Ekimoff, Lana; 'David_Downes@ios.doi.gov'; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'

Subject:

(b)(5)

Please see attached.

(b)(5)

48

Enron Q & A

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

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(b)(5)

Draft 7/5/02 Harvetta Asamoah

California Markets Q&A

Draft 7/5/02 Harvetta Asamoah

3

Draft 7/5/02 Harvetta Asamoah

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(b) (5)

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- chronic underscheduling of load and generation within the ISO; and

Draft 7/5/02 Harvetta Asamoah

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Asamoah, Harvetta

From: Asamoah, Harvetta

Sent: Wednesday, July 03, 2002 1:12 PM

To: 'cbalassa@ustr.gov'; Ekimoff, Lana; 'David_Downes@ios.doi.gov'; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'

Cc: Bradley, Samuel

Subject: Financial Times: US to seek more open regulation of services WTO TALKS

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Financial Times (London)

July 2, 2002, Tuesday London Edition 1

SECTION: INTERNATIONAL ECONOMY; Pg. 10

LENGTH: 503 words

HEADLINE: US to seek more open regulation of services WTO TALKS:

BYLINE: By EDWARD ALDEN and MICHAEL MANN

DATELINE: BRUSSELS

BODY:

The US will press its trading partners to adopt American-style regimes for the regulation of commercial activities as part of a sweeping proposal to open up global markets in service industries.

In requests tabled yesterday as part of the Doha Round world trade negotiations, the US said it wanted other countries to establish clear and open procedures for regulating banks, insurance companies, telecommunications firms and other industries.

In the US, companies are closely consulted well in advance of new regulations that might affect them. The lack of similar procedures in most developing countries and some advanced ones, such as Japan, has been a major irritant for US companies operating abroad.

The US proposal is likely to meet resistance from developing countries, where regulations are often drawn up without public input and many services sectors are still dominated by government monopolies that tailor regulations to their own commercial needs. "It will be a very hard to get other countries, even a small, critical mass of foreign countries, to sign on to this," said Bob Vastine, who heads a US business coalition representing services exporters.

The US sees the services negotiations as offering the largest potential gains from the new round of trade talks. Peter Allgeier, deputy US trade representative, said yesterday that full liberalisation of services trade globally could produce Dollars 1,000bn in new commerce worldwide, of which US companies might capture as much as half. US service exports in 2000 totalled Dollars 279bn, double the level of a decade ago.

49.

The US has not released its detailed requests to 127 countries, but a public summary of the proposals shows the scope of US ambitions.

Despite the Enron debacle, for instance, the US for the first time wants to see other countries open their markets to foreign energy trading companies, transmission service providers and oil and gas drillers. All facets of the energy markets, except generation plants and the ownership of energy resources, should be open to competition, the US says.

Mr Allgeier also indicated that the US wanted significant additional opening by China, despite arguments from some inside the US administration that China should not be pushed too hard when it is still implementing politically difficult concessions made to join the World Trade Organisation.

Express delivery services, where Federal Express and United Parcel Service of the US are involved in disputes over access in Europe and Canada, will be another new area of negotiations.

The EU, which is set to release its proposals this week, says it already has the most open services market in the world and will seek to "rebalance" that through commitments from others. The EU is expected to press the US to open its water and waste services, to allow foreign companies to compete for mail delivery **and to end laws that allow only US ships to carry cargo between US ports.**

Additional reporting by Michael Mann in Brussels

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Friday, May 17, 2002 9:02 AM
To: 'Carol Balassa'; 'Richard_Boll@ita.doc.gov'; Ekimoff, Lana; 'melly@usitc.gov'
Cc: Deutsch, Kathleen; Bradley, Samuel
Subject: Privatization Efforts in Mexico Face Ongoing Obstacles; Opportunities Impacted

May 15, 2002

Privatization Efforts in Mexico Face Ongoing Obstacles; Opportunities
 for U.S. Companies Impacted
 By Will McNamara
 Director, Energy Industry Analysis

[News item from Dow Jones] By overturning a presidential decree aimed at encouraging more private investment in Mexico's state-run electricity sector, the Mexico Supreme Court may have pushed a thorny issue higher up the legislative agenda. Supreme Court justices voted 8-3 in late April to reverse a decree by President Vicente Fox that would have allowed private generators to sell excess capacity to the state-owned Federal Electricity Commission, or CFE as the larger of the government's two power utilities is known. Noe Navarrete of the ruling National Action Party (PAN) and member of the lower house energy committee, said the ruling puts the ball squarely in the Mexican Congress' court, where lawmakers have been sitting on power-sector proposals for the past three years.

Analysis: Although this news item seems to cast a somewhat positive tone over the prospects of electric privatization in Mexico, the general consensus on the matter is far less optimistic. In what has emerged as a volatile mix of power and politics, the push for deregulation in Mexico, led by President Fox and his conservative PAN party, continues to face what appear to be insurmountable odds. While on the surface this may seem like a problem that is only of concern to those south of the U.S. border, the fact of the matter is that the delays in privatization are restricting the competitive opportunities that U.S. energy companies had begun to map out in Mexico. Further, an integral part of President Bush's goal to increase supplies of energy has been the strengthening of import systems from Canada in the north and Mexico in the south. The relationship with Canada continues to gain momentum, especially now that Ontario has deregulated its electric market, allowing U.S. companies to sell power to the province's power companies. Not so in Mexico, where those in political control have consistently blocked any attempts to dismantle the monopoly of the state-run companies. Along with dampening President Bush's plan for increased energy trade between the United States and Mexico, the political restrictions against privatization in the country also should likely impede any significant private investment that might occur in the Mexican energy sector. One exception is private investment in liquefied natural gas (LNG), which some U.S. energy companies believe can be more easily exported to the United States to capitalize on the growing demand for natural gas.

For background, the Mexican oil and electricity industries were nationalized in 1938 and in 1960, respectively, and ever since then the issue of opening the market to private ownership has been a political hot button that has never garnered the necessary support to gain any real momentum. Let's fast-forward to early 2001, when the California energy crisis was at its peak and the U.S. government, including the Bush administration and FERC, continued to wrestle with how to increase power supplies in the Golden State. In what was perceived as a revolutionary idea to many observers, President Bush began to spearhead a plan to transfer fuels such as oil and natural gas from Mexico to the United States, along with electricity that could be generated by new plants built south of the U.S. border. As noted, President Bush also envisioned a similar plan for Canada that has begun to materialize. The increased reliance on imports from Mexico was a plan that President Fox seemed to agree with in theory, as Mexico would also profit from the export of power to the United States. Energy Secretary Spencer Abraham expanded upon President Bush's vision and called also for increased transmission capacity from the Mexican border to California. By all accounts, this proposed partnership between the United States and Mexico on energy issues was a major expansion upon the provisions included

7/15/2002

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in the North American Free Trade Agreement (NAFTA), which was approved under the Clinton administration. Along with the need for increased power supplies that was prominent in early 2001, energy companies also liked the idea of being able to sell power to Mexican buyers, and the prospects of more lenient environmental regulations that might make it easier to build power plants in Mexico than in the United States.

Nevertheless, despite these lofty goals, the dynamics of Mexican politics began to throw cold water on the Bush / Fox mutual back-scratching plan. Increased energy trade between the United States and Mexico would be contingent on first deregulating Mexico's energy market and dismantling the monopoly that exists for CFE and Central Light and Power, the other state-owned electric company. The state-owned Petroleos Mexicanos (Pemex) holds a monopoly on crude-oil production, natural-gas extraction and most refining. Under a Mexican law passed in 1992, private companies can generate electricity for their own use, but the sale of excess capacity from those plants to the CFE is limited to 20 MW. In addition, the country has allowed very limited private investment in power generation under independent power producer (IPP) arrangements, but this is a market that has not materialized due to the lack of a free market for selling power.

It is clear from the ruling in the Mexico Supreme Court that restrictions against a competitive energy market will not be removed very easily, and this resistance appears to be as much tied into political opposition against President Fox as it is based on any inherent fear of electric competition. The court ruled that President Fox had overstepped his authority in raising the amount of power above 20 MW that CFE could buy from private companies that have excess power to sell. In the measure supported by President Fox, electricity generators would have been allowed to sell up to 50 percent of their total production to the state. In a separate measure, Mexican legislators also decided in late April to leave in place constitutional provisions that prevent private participation in the generation, distribution and marketing of electricity, which essentially has also established another brick wall around the monopoly system in the country.

Even prior to the start of the Fox administration in early 2001, some officials in the Mexican government had been seeking ways to attract private investment in the country's energy infrastructure, as some estimates have indicated that it will cost \$5 billion a year in infrastructure upgrades to continue meeting future energy demand in Mexico, something that the government may not be able to afford. However, the uncertainty of being able to sell power in a competitive market has kept many private investors from pouring additional capital into Mexico. The reason that some stakeholders in Mexico's energy market are optimistic that privatization efforts will accelerate is that the 1992 law has once again come into question due to the Mexico Supreme Court's overturning of President Fox's motion to allow private generators to sell directly to the CFE. In other words, the Mexican congress will have to decide if the 1992 law should be upheld, and if it is not then the Mexican energy market could be rebuilt from "the ground up."

Seeing a potentially lucrative competitive opportunity, U.S. energy companies already have begun to establish a presence in Mexico, anticipating that the market would soon open to competition and that export opportunities to the United States would increase. For example, Enron Corp. and Tractebel, recognized as the fifth-largest IPP in the world, partnered to build a 250-MW cogeneration plant in Monterrey, Mexico, near the Mexico/Texas border. French company Suez Lyonnaise des Eaux and Tractebel completed a deal to buy Enron's stake in the plant before the company went bankrupt. Sempra Energy, parent company to San Diego Gas & Electric and Southern California Gas, is building a 600-MW, gas-fired power plant near Mexicali, a few miles from the U.S. border, and a joint venture of Royal Dutch/Shell and Bechtel is building a 750-MW gas-fired plant in the same area. However, the recent ruling from the Mexico Supreme Court may put such projects into question and dissuade other companies from constructing power plants in Mexico that could be used to export power to the United States or trade within Mexico itself.

As I mentioned, the one energy market in Mexico that appears to be still developing is production and transportation of liquefied natural gas, primarily from the Baja California and Gulf of Mexico regions. LNG is a heavily compressed form of natural gas, taken from deep under the Earth's surface and subjected into super-cold temperatures (minus 320 degrees) that turn it into a liquid that can be safely shipped by ocean tankers. A good number of U.S. companies have invested heavily in the region in order to obtain LNG from tankers and then distribute it to buyers in both the United States and Mexico. According to a recent prediction from the American Bureau of Shipping, between five and 20 offshore terminals could be built in the next 10 years, including those that would be located off the shore of Mexico. Toward that end, Sempra Energy has made one of the proposals for an LNG terminal on land it already has rights to near Ensenada. El Paso Energy, which is recognized as one of the largest natural gas-pipeline companies in the United States, is reportedly planning to site a receiving terminal near Rosarito Beach, closer to the Mexican border by a few miles than Sempra's site. Shell Gas & Power, a unit of Royal Dutch/Shell Group, was the latest to announce plans to bring LNG to a

"regasification" terminal on the Baja California coastline, a \$500-million project set to be in operation by 2006.

With regard to the transmission sector of Mexico, this aspect of the country's energy market also remains heavily state-controlled. However, according to my contacts at American Electric Power (AEP), the company owns about five transmission interconnections into Mexico, some of which the company gained through its acquisition of Central & South West Corp. (CSW). For instance, in July 1999, CSW and CFE announced plans to install an asynchronous electrical tie using a new high-voltage direct-current (HVDC) technology linking the transmission systems of CSW's Central Power & Light (CPL) subsidiary with the Mexican transmission system owned and operated by CFE. The 36-MW electric tie is now operational and is connected to an existing 138-kilovolt tie-line between Piedras Negras, Mexico, and Eagle Pass, Texas, giving both AEP and CFE 38 MW of transfer capability.

Moreover, in early February 2002, Standard & Poor's issued a prediction that the Mexican government will fail in its bid to overhaul its energy sector in 2002, and this prediction appears to be ringing true. If Mexico does not stand any chance of opening its electric market to competition in the near future, how will this impact the U.S. energy companies that have already begun to invest in energy infrastructure along Baja California or into Mexico? In addition, if Mexico's energy market remains under monopoly status, does that automatically close the door on any competitive opportunities for international companies? Much like we have seen in Canada, one new effort to get around the heavy restrictions that exist in the Mexican energy market is a call to list shares of the state-owned companies on the stock exchange. Some Mexican politicians have also called for an independent management of the state-owned companies that would be free from political interference. However, it must be understood that Mexico is in a much different position from Canada, which already has two provinces that have opened their electric markets to competition. In contrast, Mexico as a whole will probably not enact any form of competition for some time, which clearly puts any additional investment into the energy infrastructure of the country at risk, as well as the mutual collaboration that President Bush had envisioned between the two countries.

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Our staff is comprised of leading energy experts with diverse backgrounds in utility generation, transmission and distribution, retail markets, new technologies, I/T, renewable energy, regulatory affairs, community relations, and international issues. Contact consulting@scientech.com or call Nancy Spring at 505.244.7613.

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Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, April 25, 2002 8:59 AM
To: 'Carol Balassa'; 'ddownes@att.net'; 'Richard_Boll@ita.doc.gov'; Ekimoff, Lana; 'melly@usitc.gov'
Subject: National Grid Merger: The British are coming

5 { } 05

-National Grid / Lattice Merger Sets the Stage for More U.S. Transmission Acquisitions

Will McNamara
 Scientech - April 24, 2002

By Will McNamara Director, Energy Industry Analysis

[News item from National Post] National Grid Group, Plc, the world's largest independent electricity transmission company, and Lattice Group Plc, Britain's national distributor of natural gas, announced on April 22 that they plan to combine in an all-share deal valued at roughly \$21.5 billion. The all-share deal was billed as a merger of equals, with only a 3.6-percent takeover premium for Lattice shareholders as of the April 19 closing price. The merger, pending regulatory approvals, is expected to close in the fall of 2002 and will create a new company to be known as National Grid Transco.

Analysis: They are calling this a "merger of equals," but make no mistake that this transaction is really National Grid's deal. The transaction adds ammunition to National Grid's growth strategy, positioning it as the largest industry player in the U.K. market, a company to rival its largest competitors in Europe (such as France's EDF, Germany's E.On and Italy's Enel) and perhaps most importantly an increasingly formidable player in the U.S. market with more available cash to spend on acquisitions. While the purchase of Lattice works for National Grid on several different levels, the deal's connection to the company's sights on the United States is perhaps most significant. In fact, some observers have said that the deal sends off echoes of the old refrain heard long ago in the Northeast: "The British are coming! The British are coming!" It's true, but in this case the British are represented by National Grid, and the company is moving aggressively to lock in transmission deals in the United States, a strategy that had already gotten off to a strong start but which will now be financially backed by its new partnership with Lattice. Considering Lattice's own expertise in the natural-gas infrastructure in the United Kingdom, we might also see the new National Grid Transco expand its horizons toward managing natural-gas infrastructure assets in the United States as well. Whatever the

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agenda, National Grid now stands out as a sharp contrast when compared to U.S. energy companies, most of which are still taking steps to sell off assets in an effort to strengthen their balance sheets in the wake of the Enron collapse and continuing economic and accounting pressure. National Grid is clearly hungry, and on its menu is a list of potential U.S. assets that are key to this nation's energy infrastructure.

In case you are not entirely familiar with National Grid (rest assured, you soon will be), let's establish some of the key characteristics of the company and this particular transaction. National Grid was formed in 1990 during the time when Britain dismantled its state-monopoly system and is presently a company that owns and manages the electric transmission system in England and Wales. As a mirrored counterpart, Lattice is the gas transmission and pipeline company that owns the British company known as Transco. Under the transaction agreement, National Grid is offering 0.375 of its shares for each Lattice share.

Some eyebrows were raised when the deal was announced, considering that National Grid has stated previously that it is focused on U.S. expansion. However, the acquisition of Lattice is actually a very shrewd conduit for National Grid to bolster that planned expansion. As I mentioned, it's not very accurate to call this deal a merger of equals as National Grid shareholders reportedly will own 57.3 percent of the new company and Lattice shareholders will claim the remaining 42.7 percent. In addition, National Grid will appoint the majority of the executive board of directors, including the new company's CEO. It is, however, accurate to refer to the deal as a marriage between monopolies, as both companies have remained heavily regulated in the United Kingdom (thus prompting the need for expansion abroad).

National Grid's strategy regarding this transaction is crystal clear. Consider these words from Roger Urwin, National Grid's CEO: "We shall deploy the combined resources and financial capacity of National Grid Transco to take advantage of opportunities in the liberalizing energy markets abroad, in particular extending National Grid's successful U.S. strategy." It doesn't get clearer than that, but how will National Grid's "successful U.S. strategy" continue to manifest? In order to look forward, let's first take a look back. In January, National Grid completed its \$3-billion acquisition of Niagara Mohawk, creating the nation's ninth-largest utility. Niagara Mohawk was the third acquisition that National Grid has made in the United States, and all three purchases have been of utilities based in the Northeastern part of the country. Previously, National Grid purchased New England Electric System (NEES) and Eastern Utilities Associates (EUA).

For over two years, it has been National Grid's strategy to build shareholder value through developing earnings outside of its U.K. transmission business by using its core skills in the development and management of infrastructure assets and systems. In other words, National Grid wants to establish a major presence in the transmission and distribution sectors of the industry, primarily in the United States. The

company already is on track to accomplish this goal, as National Grid reportedly now derives about 60 percent of its revenues from operations in the United States. The two previous acquisitions of NEES and EUA provided National Grid with strong transmission and distribution assets in Massachusetts, Rhode Island and New Hampshire. Along with these acquisitions, National Grid has formed a managerial relationship with the Alliance RTO, one of the largest regional transmission organizations that has developed out of FERC's consolidation policy for transmission entities, which is attempting to merge operations with the Midwest ISO.

Rightfully so, National Grid views the Northeastern part of the United States as a region where deregulation is comparatively advanced. This area of the country is providing National Grid with the best point of entry into the U.S. energy market. The economic climate offers strong opportunities for competition, and the Northeastern states that have deregulation plans tend to offer performance-based regulation (rate of returns that are favorable for operating utilities in the area). In addition, the companies that have been acquired by National Grid will benefit from its track record of high-quality, low-cost transmission service in the competitive U.K. market.

The previous U.S. acquisitions reportedly have left National Grid with about £8.2 billion, taking it very near the limits set by American regulatory standards. In other words, National Grid would not be able to further expand as it wants to in the United States without finding a way to reduce its debt. Enter Lattice and the pending acquisition. According to available reports, the acquisition should result in cost-savings in the range of £100 million per year. In addition, together the combined companies reportedly will have an annual operating cash flow of £3.5 billion and a combined market value of £15 billion, which should provide adequate financial resources to support additional purchases of U.S. companies and / or assets. Speculation about specific companies that National Grid may attempt to buy is already swirling, and I've seen reports that mention Energy East of Albany, N.Y., Northeast Utilities of Hartford, Conn., and NSTAR of Boston as possible targets. For its part, National Grid says it won't begin to investigate possible U.S. acquisitions until it has completed the purchase of Lattice.

I don't mean to overlook the importance that this acquisition plays regarding National Grid's position in Europe, as it is significant. The purchase of Lattice will position National Grid as the fourth- largest energy company in Europe, which puts it behind EDF of France and Germany's RWE and E.On. The other companies have been very aggressive in acquiring U.K. assets (for instance, EDF's purchase of London Electricity), so the partnership between the two British companies keeps both National Grid and Lattice rather protected from any takeover attempts and strengthens their positions as competitors in the European marketplace.

Investors seem to be reacting positively to the acquisition, at least in the United Kingdom where National Grid shares are traded. According to reports in the British press, shares in both companies on the London Stock Exchange rose on word of the deal, National Grid by 3.5 percent and

Lattice by 12 percent. The increase was notable considering that in deals of this nature, especially when the companies involved speak of additional expenditures, shares tend to go down. The increase most likely speaks to the strength of National Grid's agenda, which is squarely focused on expansion in the United States.

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Asamoah, Harvetta

From: Asamoah, Harvetta

Sent: Thursday, April 25, 2002 8:49 AM

To: 'Carol Balassa'; 'ddownes@att.net'; 'Richard_Boll@ita.doc.gov'; Ekimoff, Lana; 'melly@usitc.gov'

Subject: Coalition calls for transparency in U.S. energy markets

(b)(5)

PR Newswire - April 24, 2002

WASHINGTON, April 24 /PRNewswire/ -- A broad-based coalition of natural gas producers, service companies, consumer groups, towns and utilities is calling on Congress and federal regulatory agencies to restore fairness, integrity and transparency to the nation's gas and electricity markets in the wake of the Enron debacle.

The Coalition for Energy Market Integrity and Transparency said today that energy deregulation has been hijacked by speculators and futures traders operating under the guise of "energy marketers" who have rigged the system to skim billions of dollars from producers and consumers, while providing little or no actual services.

California State Sen. Joseph L. Dunn, who is leading an investigation of possible energy market manipulation during the state's energy crisis of 2000 and 2001, presented new evidence of price fixing by Enron and others during that period.

"Enron and its clones promised greater efficiency and cheaper energy prices but have delivered just the opposite," Dunn said. "In the fourth quarter of 2000, unregulated marketing companies controlled 64 percent of the gas pipeline capacity coming into California. They used their unprecedented market power to run up the cost of gas as high as \$60 per million BTU in December. The price that month averaged \$25 per million BTU, about four times higher than it should have been.

Dunn said unregulated companies such as Dynegy also controlled 74 percent of California's gas fired electric generation during the winter of 2000-2001. "With zero accountability and no market transparency, the marketer-traders were able to charge whatever they wanted until the federal government finally stepped in with price caps," he said. "But since they also had control over the gas, they were able to bypass the caps and still gouge consumers." Dunn said the crisis cost California at least \$9 billion. He said most other states are vulnerable to price-fixing schemes, "and the risk is growing as more gas-fired generating plants come on line."

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Coalition member Arthur Corbin, president and general manager of the Municipal Gas Authority of Georgia, spoke on behalf of the American Public Gas Association, representing municipal gas utilities.

"From the consumer's point of view, we must focus on allowing the markets to work properly so that consumers pay the 'real' market price, not a manipulated or gamed price," Corbin said. "Natural gas is far too important to this country to allow speculators and traders to churn the commodity at a multiple of hundreds, if not thousands, of times the actual amount of physical gas supplies, resulting in a market where the price skyrockets from \$2 to \$10 and back down below \$2 in a matter of 18 months." Corbin said the unprecedented increase in volatility has coincided with the equally unprecedented proliferation of energy derivatives contracts in the natural gas and electricity markets, the explosive growth of energy marketing and trading companies like Enron, greater speculation in the markets, and growth of computerized trading platforms like EnronOnline. He called on Congress and the regulators to protect consumers by making the trading of over-the-counter energy derivatives subject to the same regulatory oversight as the trading of commodities on the New York Mercantile Exchange (NYMEX) and other exchanges.

Corbin said, "The basic rules of fair dealing, reporting, price discovery and availability of timely and meaningful market information to all -- not just inside traders -- are hallmarks of legitimate exchanges and should be brought to the over-the-counter markets, including on-line platforms." He added that accurate, timely gas supply, transportation and storage reports should be required by the federal government, with penalties imposed on companies that misrepresent the numbers or fail to provide information.

"Right now, all this reporting is voluntary, and the numbers are all over the map. Incomplete, inaccurate and unsubstantiated numbers can and do affect the price of gas," Corbin said.

Apache Corporation Chairman and CEO Raymond Plank, representing natural gas producers, said "The marketer-speculators are destroying North America's natural gas business by promoting unwarranted price volatility. Producers have no idea where the price of gas is going to be tomorrow, much less a year or two from now, when they begin earning a return on their investment, so we drill fewer and fewer wells."

He said each price downturn forces producers to shut in marginal gas wells that can never be restored to production. "With every down-cycle, we lose valuable infrastructure, capital and people," Plank said. "Even with 1,000 drilling rigs running, we have barely been able to keep gas production flat; the latest downturn has taken the rig count below 700. That sets up the next supply shortage, which will mean higher prices for consumers. The only winners are the middlemen."

Plank said marketer-traders such as Dynegy, El Paso and The Williams Companies helped kill the Feinstein amendment to the Senate Energy bill,

1051
 "which would have provided only modest oversight of over-the-counter energy trading markets. The last thing they want is the bright light of day shining on their operations."

The coalition's mission is to reform energy markets to ensure their fairness, transparency and openness in order to provide adequate, reliable and affordable energy supplies for America. Its goals include:

- Reducing unwarranted price volatility in energy markets;
- Reducing the potential for energy market manipulation;
- Ensuring energy markets are open and transparent to the timely disclosure of supply, demand and price data;
- Requiring traders in over-the-counter markets and on-line trading platforms to have the ability to perform and fulfill their contractual obligations;
- Assuring that regulated affiliates of energy companies are effectively separated from their unregulated affiliates in their decision-making and actions; and
- Reforming the accounting treatment of energy derivatives transactions to assure that mark-to-market accounting and other techniques are not used by energy traders to misrepresent themselves or distort energy markets.

The Coalition for Energy Market Integrity and Transparency is a nonprofit organization. Members include: American Public Gas Association; American Public Power Association; Apache Corporation; Batesville (Indiana) Water and Gas Utility; Cairo (Illinois) Public Utility Company; City of Loretto (Tennessee); Florence Utilities; Gloster (Mississippi) Municipal Gas System; Halliburton; Harrisburg (Arkansas) Water & Gas System; Horton Highway Utility District of Rutherford, Williamson & Marshall Counties (Tennessee); Huntingburg (Indiana) Gas Division; Louisiana Independent Oil and Gas Association; Middleborough (Massachusetts) Gas and Electric Department; Municipal Gas Authority of Georgia; National Rural Electric Cooperative Association; Noble Drilling; Norwich Department of Public Utilities; the Public Energy Authority of Kentucky; Schlumberger; Smyrna (Tennessee) Natural Gas System; Town of Utica (Mississippi); and Texas Independent Producers and Royalty Owners Association.

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Asamoah, Harvetta

From: Asamoah, Harvetta

Sent: Friday, March 15, 2002 9:44 AM

To: 'Carol Balassa'; 'ddownes@att.net'; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'

Cc: Pumphrey, David; Bradley, Samuel; Billig, Michelle

Subject: Report on New York v. FERC

(b)(5)

55.

Asamoah, Harvetta

From: Billig, Michelle
Sent: Wednesday, March 13, 2002 4:05 PM
To: 'Carol Balassa'; ddownes@att.net; Pumphrey, David; Asamoah, Harvetta; Richard_Boll@ita.doc.gov; CMelly@usitc.gov; R Federal Record
Cc: Billig, Michelle; Bradley, Samuel
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

Carol,

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Wednesday, March 13, 2002 3:51 PM
To: ddownes@att.net; David.Pumphrey@hq.doe.gov; Harvetta.Asamoah@hq.doe.gov; Richard_Boll@ita.doc.gov; CMelly@usitc.gov; R Federal Record
Cc: Michelle.Billig@hq.doe.gov; SAMUEL.BRADLEY@hq.doe.gov
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

Thank you, David. I believe that view is reflected in the attachment, but would welcome any further comments you may have.

>>> "Pumphrey, David" <David.Pumphrey@hq.doe.gov> 03/13/02 03:37PM >>>

-----Original Message-----

From: Asamoah, Harvetta
Sent: Wednesday, March 13, 2002 2:57 PM
To: 'Carol Balassa'; ddownes@att.net; Richard_Boll@ita.doc.gov; CMelly@usitc.gov
Cc: Pumphrey, David; Bradley, Samuel
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

I sent this to David Pumphrey for any comments or suggestions.

(b) (5)

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]

Sent: Wednesday, March 13, 2002 11:32 AM

To: ddownes@att.net; Mcleod.Barbara@epa.gov;

Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov;

David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov;

Greg.Hall@marad.dot.gov; EnisME@state.gov; Richard.Larm@usdoj;

Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; Steve
Fabry; R Federal Record

Cc: Peter Collins; Joseph Papovich

Subject: Talking points on Enron's collapse

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Enron Q & A

Q.

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A.

Asamoah, Harvetta

From: melly@usitc.gov
Sent: Wednesday, March 13, 2002 10:44 AM
To: Asamoah, Harvetta; cbalassa@ustr.gov; Harvetta.Asamoah@hq.doe.gov;
Richard_Boll@ita.doc.gov; rschroeder@ustr.gov
Subject: RE: Halliburton meeting notes



HALLIBURTON.WPD

Sorry, here's the attachment!

----- Original Text -----

From: "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov>, on 3/13/02 10:24 AM:
To: iSMTP@MASTER7@ADP7[<cbalassa@ustr.gov>], iSMTP@MASTER7@ADP7["Asamoah,
Harvetta"
<Harvetta.Asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7[<rschroeder@ustr.gov>], iSMTP@
MASTER7@ADP7[<Richard_Boll@ita.doc.gov>], Christopher Melly@SI@ID

Chris -- You forgot the attachment.

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-----Original Message-----

From: melly@usitc.gov [mailto:melly@usitc.gov]
Sent: Wednesday, March 13, 2002 9:58 AM
To: cbalassa@ustr.gov; harvetta.asamoah@hq.doe.gov; rschroeder@ustr.gov;
Richard_Boll@ita.doc.gov
Subject: Halliburton meeting notes

(b)(5)

Chris

**Meeting with Halliburton
March 12, 2002**

Halliburton

Don Deline

Regina Piazza

???

USG

Carol Balassa, USTR

Ryan Schroeder, USTR

Rich Boll, DOC

Harvetta Asamoah, DOE

Chris Melly, ITC

David Downes, Interior

Business background:

- Halliburton does everything except drilling, which is done either by the oil company or a drilling contractor. Halliburton staff would be engaged *during* the drilling process to perform functions like simultaneous logging used to direct the drill bit. Halliburton also builds platforms, lays pipelines, and builds refineries (through the Brown & Root subsidiary?)
- Halliburton owns or leases some specialized vessels to provide services like fracturing or pipelaying, but these are not US built, flagged or manned. Vessels have been leased from Norway, UK, and Korea. Halliburton also uses remote operating vehicles (ROVs) that perform various underwater construction and maintenance functions.

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Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Tuesday, March 05, 2002 8:57 AM
To: 'Carol Balassa'; ddownes@att.net; Mcleod.Barbara@epa.gov; Ekimoff, Lana;
Richard_Boll@ita.doc.gov; EnisME@state.gov; Richard.Larm@usdoj;
Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; 'sfabry@ustr.gov'
Cc: Bradley, Samuel
Subject: New York v. FERC

(5) [The Slip Opinion is on the Supreme Court website at:

<http://www.supremecourtus.gov/opinions/01slipopinion.html>

The Court's summary of its decision states that: "The FPA's plain language readily supports FERC's jurisdiction claim. Section 201(b) gives FERC jurisdiction over 'electric energy in interstate commerce,' and the unbundled transmissions that FERC has targeted are made such transmissions by the national grid's nature."

The summary further states: "No statutory language limits FERC's transmission jurisdiction to the wholesale market, although the statute does limit FERC's sales jurisdiction to that market. In the face of this clear statutory language, New York's arguments supporting its contention that the statute draws a bright jurisdictional line between wholesale and retail transactions are unpersuasive," and "FERC's decision not to regulate bundled retail transmissions was a statutorily permissible policy choice."

-UPDATE 1-U.S. high court upholds FERC
open access order

Reuters (March 04, 2002)

WASHINGTON, March 4 (Reuters) - The U.S. Supreme Court Monday upheld a 1996 Federal Energy Regulatory Commission (FERC) order designed to ensure open access to the interstate energy transmission grid.

The vote is a major victory for proponents of competitive U.S. electricity markets, industry officials said.

The justices affirmed a U.S. appeals court ruling that upheld the regulations that seek to end discriminatory, anti-competitive practices and to make sure consumers pay the lowest prices possible.

The justices rejected two separate challenges. One was brought by state regulatory commissions from New York, Florida, Idaho, New Jersey, North Carolina, Virginia, Washington, Vermont and Wyoming, while the other challenge came from a unit of the collapsed Enron Corp.

New York and the states argued that FERC's 1996 order oversteps state authority over intrastate commerce set in the 1935 law, while Enron asserted FERC did not go far enough and should expand its authority to both retail and wholesale markets.

Justice John Paul Stevens, said for the court majority: "Whether or not the 1935 Congress foresaw the dramatic changes in the power industry that have occurred in recent decades, we are persuaded, as was the court of appeals, that FERC properly construed its statutory authority."

Electricity groups called the action a major boost for the FERC's efforts to open the \$220 billion U.S. electricity market to greater competition.

"(The action is a) major victory for wholesale power markets," said Mark Stultz, a spokesman for the Electric Power Supply Association.

Jim Owen, a spokesman for the Edison Electric Institute said: "The decision today reaffirms the wisdom of FERC's approach."

The high court heard arguments in October on a case appealed from the U.S. Appeals Court for the District of Columbia, which upheld the FERC's authority to regulate state transmission in a June 2000 ruling.

Enron -- once the largest U.S. wholesale power player and an ardent proponent of open markets and nationwide deregulation -- argued the FERC should have authority to force competition of all transmission assets.

The Justices voted 6-3 to uphold the FERC's middle-ground approach to regulate unbundled retail transmission service, but not bundled services as Enron proposed.

"FERC's decision not to regulate bundled retail transmission was a statutorily permissible policy choice," Stevens wrote in his majority opinion.

In a separate companion case, the state of New York argued the FERC went too far in regulating flows of electricity within the state.

The high court voted unanimously to uphold the FERC, rejecting New York's request for the court to revoke the FERC's authority to regulate retail sales, because electricity involved in such sales stays within state and is not subject to federal regulation.

boundaries

"FERC did not exceed its jurisdiction by including unbundled retail transmission within the scope of Order 888's open access requirement," Stevens wrote.

The high court affirmed Order 888, which the FERC approved in 1996 after it found that transmission-owning utilities have an inherent incentive to bar access to their wires by competing companies.

The order opened the grid to wholesale competition by forcing utilities to

offer nondiscriminatory policies to energy firms that want to ship electricity over non-owned transmission lines.

(additional reporting by James Vicini in Washington)

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-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]

Sent: Monday, March 04, 2002 5:28 PM

To: ddownes@att.net; Mcleod.Barbara@epa.gov;

Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov;

David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov; EnisME@state.gov;

Richard.Larm@usdoj; Richard.Larm@usdoj.gov; CMelly@usitc.gov;

JBaumert@usitc.gov; Steve Fabry; R Federal Record

Subject: Bedtime reading

Supreme Court came out today with a ruling on "New York v. Federal Energy Regulatory Commission." Introductory section, which I've just gotten through, addresses the scope of FERC's authority to regulate access to and use of the electricity grid. [66]

Sorry, don't know how to get you to the Supreme Court website, but I'm sure you lawyers out there do.

Asamoah, Harvetta

From: Pumphrey, David
Sent: Wednesday, March 13, 2002 3:38 PM
To: Asamoah, Harvetta; 'Carol Balassa'; 'ddownes@att.net'; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'
Cc: Bradley, Samuel; Billig, Michelle
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

-----Original Message-----

From: Asamoah, Harvetta
Sent: Wednesday, March 13, 2002 2:57 PM
To: 'Carol Balassa'; ddownes@att.net; Richard_Boll@ita.doc.gov; CMelly@usitc.gov
Cc: Pumphrey, David; Bradley, Samuel
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

I sent this to David Pumphrey for any comments or suggestions.

According to Reuters on Dec. 4, the Energy Information Administration may review the broader implications of Enron's collapse on energy-related issues, and Secretary Abraham said that he did not think that Enron's failure would necessarily relate to issues of energy deregulation. A number of officials have made similar statements.

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Wednesday, March 13, 2002 11:32 AM
To: ddownes@att.net; Mcleod.Barbara@epa.gov; Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov; David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov; Greg.Hall@marad.dot.gov; EnisME@state.gov; Richard.Larm@usdoj; Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; Steve Fabry; R Federal Record
Cc: Peter Collins; Joseph Papovich
Subject: Talking points on Enron's collapse

Attached are talking points on a possible question at the Energy Classification Workshop on Enron's collapse. (Questions on Enron were raised at the last meeting of this group). Please provide comments/clearance by noon, tomorrow. Thanks.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Wednesday, March 13, 2002 2:57 PM
To: 'Carol Balassa'; ddownes@att.net; Richard_Boll@ita.doc.gov; CMelly@usitc.gov
Cc: Pumphrey, David; Bradley, Samuel
Subject: RE: Talking points on Enron's collapse for GATS Energy Services Meeting

(b)(5)

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Wednesday, March 13, 2002 11:32 AM
To: ddownes@att.net; Mcleod.Barbara@epa.gov;
Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov;
David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov;
Greg.Hall@marad.dot.gov; EnisME@state.gov; Richard.Larm@usdoj;
Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; Steve
Fabry; R Federal Record
Cc: Peter Collins; Joseph Papovich
Subject: Talking points on Enron's collapse

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A.

(b)(5)

A.

Asamoah, Harvetta

From: Carol Balassa [CBALASSA@ustr.gov]
Sent: Wednesday, March 13, 2002 11:32 AM
To: ddownes@att.net; Mcleod.Barbara@epa.gov; Harvetta.Asamoah@hq.doe.gov;
Lana.Ekimoff@hq.doe.gov; David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov;
Greg.Hall@marad.dot.gov; EnisME@state.gov; Richard.Larm@usdoj;
Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; Steve Fabry; R Federal
Record
Cc: Peter Collins; Joseph Papovich
Subject: Talking points on Enron's collapse



WordPerfect 6.1

(b)(5)

Q.

(b)(5)

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A.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Friday, February 22, 2002 1:05 PM
To: 'cbalassa@ustr.gov'; 'ddownes@att.net'; Ekimoff, Lana; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'
Subject: Economist Article Pro Liberalization

The February 16, 2002 issue of the Economist contains an excellent article "Energy liberalisation -- It's good for you" (page 13)

Some of the best lines are:

Enron's failure was due to the vanity and villainy of its bosses, not to the vagaries of deregulation. ... Enron's demise should therefore be treated as a reason to bolster the shift towards more competitive energy markets.

Energy restructuring in America has been a half-baked affair, thanks to regulatory turf battles and the lack of the right federal framework. Small wonder it produced a halfway house like California's, whose politicised electricity system was almost engineered for crisis. In Europe, although Britain and Scandinavia led the world in freeing energy markets, further reforms have stalled in the face of opposition from France and Germany. The danger is that consumers will be stuck in the worst aspects of deregulation but gain few of the benefits of competition. The way out is for politicians and regulators to accelerate, not to abandon, liberalisation.

Paradoxically, that now means improving energy regulation, in three ways. The first is to toughen market surveillance. Despite protests to the contrary from free-market fundamentalists, deregulation, whether in energy or elsewhere, should not be equated with no regulation.

That is why Congress should expand the supervisory powers of the Federal Regulatory Commission to include government-run utilities, from the Tennessee Valley Authority to municipal ones, that now fall outside its remit. It should also give it the resources to crack down on utilities that obstruct access to their high-voltage lines to trade power. In Europe, the European Commission needs to ensure that dug-in oligopolists do not forever maintain control of both supply and distribution. It should also keep a vigilant eye on cross-border deals that threaten to turn the European market into a stitch-up for a few giants such as Electricité de France.

When market reforms are done properly, the results can be breathtaking. In Britain, competition in the retail market for gas and power is transferring over \$2 billion a year from energy companies to their customers, including domestic households.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Wednesday, February 20, 2002 2:47 PM
To: 'cbalassa@ustr.gov'; 'ddownes@att.net'; Ekimoff, Lana; 'David_Downes@ios.doi.gov'; 'Richard_Boll@ita.doc.gov'; 'CMelly@usitc.gov'
Subject: Enron Collapse/Energy Markets: FERC Testimony

Attached are: January 29 and February 13 testimony of FERC Commissioner Pat Wood on the effect of Enron's collapse on energy markets.

The February 13 testimony states:

"I disagree with those who claim that the Enron collapse sounds the death knell for competition in energy markets or justifies nationwide reimposition of traditional cost-based regulation of electricity. The facts available to date indicate that Enron's failure had little or nothing to do with whether energy commodities and their delivery to customers are monopoly regulated or competitive. Rather, Enron appears to have failed because of its questionable non-core business investments and the manner in which it reported on its financial position to its owner-investors and to the broader business community. Based on the facts as they appear now, Enron's actions would have led to the same result whether its core business focused on energy, grains, metals or books."

"You may be aware that members of the Senate Energy and Natural Resources Committee have asked the Commission to formally investigate allegations that Enron may have exercised inappropriate influence on the nation's electric and gas markets. A comprehensive staff fact-finding investigation has begun."

"Some claim that Enron's demise is due to the failure of deregulation and competition in the electric industry, of which Enron was one of many supporters. I strongly disagree. Wholesale competition in the gas industry has spurred gas production, encouraged pipeline construction, driven down commodity prices for the past decade and lowered retail prices accordingly. In the electric sector, wholesale competition, although still in its infancy, has enabled the construction of thousands of megawatts of new power plant capacity across the country, producing lower commodity and retail electric prices in most regions, and in a cleaner generation fleet."

-----Original Message-----

From: Asamoah, Harvetta
Sent: Friday, February 01, 2002 10:15 AM
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Cc: Bradley, Samuel
Subject: FERC Testimony on Enron

Attached is the (in pdf format) on the effect of the Enron collapse on energy markets. Note that FERC is creating a new office to monitor the markets.

Here are some quotes:

"The flexibility of today's energy markets allows a buyer losing its supply to replace the energy in real-time (at least briefly) through imbalance services offered by transportation providers. With more time, such as an hour or more before a supply will be lost, a buyer generally can arrange alternative supplies from a wide range of sources. Thus, the risk of a buyer having insufficient energy because of a seller's default appears to be

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manageable, as evidenced by the recent experience with Enron."

"Enron's role in the gas and electric markets was primarily in the trading of financial assets (commodity and futures contracts) rather than physical assets (with the exception of its natural gas pipelines, which continued operation relatively untouched by the events affecting the parent and affiliated companies). Less than 10 percent of the contracts traded in these markets involve the initial producer or final wholesale customer for the product – well over 90 percent of commodity contracts and futures are between intermediate holders who are managing risk and facilitating connections between initial producers and ultimate customers. Adjustments in the financial asset marketplace – as to the length of a contract or the identities of the counterparties – rarely affect the flow of the physical gas and electricity underlying those contracts."

"Enron does control a number of natural gas pipelines, but its financial failure has had little apparent impact on their operations. But even if it had, it is worth noting that the gas and electric markets have demonstrated their ability to react to and manage around problems that could affect their ability to deliver electricity and gas."

"The markets' reaction to Enron's collapse demonstrates what good, working competitive markets do best – a diverse group of market participants with adequate market information about the players and commodities act individually to produce a result that works for all. The nation's wholesale electric and gas markets showed great resilience and swift reaction time, and demonstrated that they are much stronger than any individual player in the marketplace."

"Some claim that Enron's demise is due to the failure of deregulation and competition in the electric industry, of which it was one of many supporters. I strongly disagree. Wholesale competition in the gas industry has spurred gas production, encouraged pipeline construction, driven down commodity prices for the past decade and lowered retail prices accordingly. In the electric sector, wholesale competition, although it is in its infancy, has enabled the construction of thousands of megawatts of new power plant capacity across the country, resulting in lower commodity and retail electric prices in most regions, and in a cleaner generation fleet."

"In the electric arena, wholesale power marketers began selling electric energy as early as 1986. The Energy Policy Act of 1992, and the Commission's 1996 open access rule for electric transmission owners and operators, Order No. 888, further spurred the development of competitive electric power trading."

"To sell electricity at market-based rates, public utilities (including power marketers) must file an application with the Commission. The Commission grants authorization to sell power at market-based rates if the power marketer adequately demonstrates that it and its affiliates lack or have mitigated market power in the relevant markets. FERC conditions market-based rate authority on power marketers submitting quarterly reports of their purchase and sales activities and complying with certain restrictions for the protection of captive customers against affiliate abuse. There are currently 1200 electric power marketers authorized to sell energy at market-based rates."

"To give substance to this third strategic goal, the Commission is creating a new Office of Market Oversight and Investigation (MOI), which will concentrate the Commission's market-monitoring resources into one workgroup and enable the Commission to better understand and track wholesale energy markets and risk management by analyzing market data, measuring market performance, investigating compliance violations, and, where necessary, pursuing enforcement actions. MOI's work will provide an early warning system to alert the Commission of potentially negative market developments and let us act more proactively to address any problems that may arise. We are currently taking applications for the Director of this Office, who will report directly to me."

II. Enron's Impact on Gas and Electric Markets

Enron's collapse had little perceptible impact on the nation's commodity (wholesale) electric and gas markets, which are FERC's primary regulatory responsibility. Energy markets have adjusted quickly to Enron's collapse. The Commission's monitoring of energy markets indicates that there has been no immediate damage to energy trading or energy supplies. Although Enron transactions comprised 15 to 20 percent of wholesale energy trades, its demise has had negligible effects on trading. With a few exceptions, parties were generally able to rearrange the deals they had executed with Enron.

Market Monitoring and Reactions

From late October 2001, when news of a likely formal investigation of Enron and its auditors by the Securities and Exchange Commission (SEC) first became known, to early December 2001, after Enron's declaration of bankruptcy, spot market data indicates that there was no change in natural gas or electric wholesale prices that could not be attributed to weather or other fundamentals. (See Figures 1 and 2 in the Appendix for graphs of spot market prices). As may be expected, Enron's swift exit from trading may have increased volatility somewhat. Our staff is currently investigating this concern more thoroughly.

Following the news of a formal SEC investigation of Enron in October 2001, Commission staff contacted market participants to learn whether any supply obligations might be in jeopardy. Staff began monitoring EnronOnline more closely, particularly any changes in the margins between the bid-ask prices on EnronOnline, as a widening of these bid-ask spreads might signal less liquidity in the market; but there was no significant change in the margin between the bid and ask prices on EnronOnline.

Commission staff also contacted counterparties and received assurances from them that they were adjusting to Enron by "shortening" their positions and not entering into longer-term arrangements with Enron. In mid-November, when it appeared that the Dynegy merger¹ with Enron might be jeopardized, staff observed no significant change in the margin between the bid and ask prices on EnronOnline; at the same time, there was a marked increase in the volume traded on other online trading platforms, such as Dynegydirect and Intercontinental Exchange (ICE). Commission staff again contacted energy traders to determine whether major supply disruptions in wholesale markets were occurring, and was informed that Enron had "flattened its books," i.e., made its portfolio of trades neither long nor short so that it could more easily "step out" of transactions and not cause disruption. As events unfolded in late November and early December, other market participants stepped into these deals. With the exception of certain lightly-traded points, it appears that Enron's competitors have filled the void left behind by Enron.

The reason for this overall calmness in commodity prices is basic. Although Enron was a significant player in electric and gas markets – as a pipeline, as a commodity trader, as a futures contract trader, and as a market maker – there were many other players in these large, established commodity markets, and a great deal of market diversity. Once it became apparent that Enron might not be a stable counterparty, its trading partners began to systematically adjust their positions and practices in the marketplace, moving to other trading platforms and partners. A similar process occurred among the counterparties to Enron's longer-term, untraded gas and electric contracts. Thus, over only a few weeks time, the gas and electric markets systematically minimized Enron's role in the marketplace and the likelihood that a company-specific failure could significantly affect the underlying commodities. I believe the calm but vigilant reaction of the Commodities Futures Trading Commission, among others, during this period allowed time for this unwinding to take place.

The flexibility of today's energy markets allows a buyer losing its supply to replace the energy in real-time (at least briefly) through imbalance services offered by transportation providers. With more time, such as an hour or more before a supply will be lost, a buyer generally can arrange alternative supplies from a wide range of sources. Thus, the risk of a buyer having insufficient energy because of a seller's default appears to be manageable, as evidenced by the recent experience with Enron.

The more substantial risk in these circumstances is the loss of an advantageous contractual price for energy. Even this risk, however, depends on market conditions. When a seller defaults, market conditions for buying energy may be better or worse than when a buyer entered into its contract with the seller. If better, the buyer actually may benefit from not having to buy under the existing contract and instead being able to buy at lower prices elsewhere.

Enron's market role

Enron's role in the gas and electric markets was primarily in the trading of financial assets (commodity and futures contracts) rather than physical assets (with the exception of its natural gas pipelines, which continued operation relatively untouched by the events affecting the parent and affiliated companies). Less than 10 percent of the contracts traded in these markets involve the initial producer or final wholesale customer for the product – well over 90 percent of commodity contracts and futures are between intermediate holders who are managing risk and facilitating connections between initial producers and ultimate customers. Adjustments in the financial asset marketplace – as to the length of a contract or the identities of the counterparties – rarely affect the flow of the physical gas and electricity underlying those contracts. Thus, while the commodity markets were shortening the length of contracts and moving more trade to non-Enron partners, gas and electric deliveries continued unaffected.

Enron does control a number of natural gas pipelines, but its financial failure has had little apparent impact on their operations. But even if it had, it is worth noting that the gas and electric markets have demonstrated their ability to react to and manage around problems that could affect their ability to deliver electricity and gas. When a pipeline breaks, a compressor station fails, a transmission line collapses, or a large power plant goes off-line, the parties in the market adjust immediately to acquire other supplies and delivery routes. Having a sufficiently robust energy infrastructure makes this so. In these instances, prices may well rise and, occasionally, deliveries to retail customers may be slowed – but the wholesale market reacts swiftly and minimizes the impact to wholesale and retail customers alike.

In response to the Enron crisis, Moody's has raised the credit standards for generators and traders. This has forced energy concerns to rebalance their debt-to-asset ratios, forcing many to reduce debt and cut back investments in new gas processing, pipelines and power plants. During December 2001, stock prices of several energy companies hit yearly lows. Enron's problems, in combination with the recession and reports of potential overbuilding, appear to have eroded confidence, making investors more cautious about putting money into the energy industry. This slowdown in infrastructure investment could be problematic in some regions as the economy recovers and demand for energy grows. For that reason, the Commission has accelerated its efforts to complete the transition to a more competitive wholesale power market in order to provide investment certainty.

Enron and Competition

The markets' reaction to Enron's collapse demonstrates what good, working competitive markets do best – a diverse group of market participants with adequate market information about the players and commodities act individually to produce a result that works for all. The nation's wholesale electric and gas markets showed great resilience and swift reaction time, and demonstrated that they are much stronger than any individual player in the marketplace.

Some claim that Enron's demise is due to the failure of deregulation and competition in the electric industry, of which it was one of many supporters. I strongly disagree. Wholesale competition in the gas industry has spurred gas production, encouraged pipeline construction, driven down commodity prices for the past decade and lowered retail prices accordingly. In the electric sector, wholesale competition, although it is in its infancy, has enabled the construction of thousands of megawatts of new power plant capacity across the country, resulting in lower commodity and retail electric prices in most regions, and in a cleaner generation fleet.

III. The Commission's Regulation of Enron Subsidiaries

The Commission does not regulate the parent corporation, Enron Corporation, as it does not engage in activities which are under FERC jurisdiction. FERC does regulate eleven of Enron's approximately 100 subsidiaries. Our authority, and the specific names of the Enron subsidiaries subject to our jurisdiction, are described below.

The Commission has jurisdiction over sales for resale of electric energy and transmission service provided by public utilities in interstate commerce. The Federal Power Act includes energy marketers and traditional vertically integrated electric utilities in its definition of public utilities. The Commission must ensure that the rates, terms and conditions of wholesale energy and transmission services are just, reasonable, and not unduly discriminatory or preferential. FERC also is responsible for reviewing proposed mergers, acquisitions and dispositions of jurisdictional facilities by public utilities, and must approve such transactions if they are consistent with the public interest. We also regulate the issuance of securities and the assumption of liabilities by public utilities not regulated by States.

The Commission also has jurisdiction over sales for resale of natural gas and transportation. However, FERC jurisdiction over sales for resale is limited to domestic gas sold by pipelines, local distribution companies, and their affiliates, (including energy marketers.) Consistent with Congressional intent, the Commission does not prescribe prices for these sales.

Figure 3, in the Appendix, illustrates the distinction between physical and financial assets in the energy sector and highlights the market segments of several Enron subsidiaries. It further identifies which subsidiaries and market segments fall under FERC regulation.

A. Energy Marketers

Competitive trading of energy by "marketers" generally began about two decades ago. Marketers do not usually own physical facilities, but take title to energy and re-sell it at market-based rates. Natural gas marketing began with the deregulation of the price of natural gas in 1978 and expanded with the Commission's 1992 open access rule for natural gas pipelines, Order No. 636. In the decade since Order No. 636, natural gas marketing has developed into a large, robust activity with many marketers. The Commission lacks jurisdiction over sales of natural gas by many gas marketers. To maximize competition we have granted "blanket authorization" for those marketers under FERC jurisdiction so they do not have to file for and obtain individual approvals to sell gas at wholesale.

In the electric arena, wholesale power marketers began selling electric energy as early as 1986. The Energy Policy Act of 1992, and the Commission's 1996 open access rule for electric transmission owners and operators, Order No. 888, further spurred the development of competitive electric power trading.

The Commission regulates the following power marketers affiliated with Enron: Enron Power Marketing Inc., Enron Sandhill Limited Partnership, Milford Power Limited Partnership, Enron Energy Services, Inc., and Enron Marketing Energy Corporation.

EnronOnline

Before its collapse, Enron was the largest marketer of natural gas and electric power. Enron's Internet-based trading system, EnronOnline, was until recently the dominant Internet-based platform for both physical energy (electricity and natural gas products) and energy derivatives. (Derivatives are financial instruments based on the value of one or more underlying stocks, bonds, commodities, or other items. Derivatives involve the trading of rights or obligations based on the underlying product, but do not directly transfer property.) Although EnronOnline was the leading Internet-based trading platform for natural gas and electric power, it faced competition from other Internet-based trading platforms, such as Dynegydirect and Intercontinental Exchange (ICE).

Traditional exchanges, like the NYSE and the NYMEX, determine price by matching the buy and sell orders of many traders in a many-to-many trading format. In contrast, EnronOnline uses a one-to-many trading format, where an Enron affiliate is always on one side of each energy transaction, either as a seller or a buyer. The price of a commodity or derivative on EnronOnline is determined when a buyer or a seller accepts an offer or bid price posted by an Enron trader. In the wake of Enron's downfall, the many-to-many platforms such as ICE have helped to fill the void, and create a more robust market by reflecting the bid and offer values of myriad different energy buyers and sellers.

Market-based Rate Authorization

To sell electricity at market-based rates, public utilities (including power marketers) must file an application with the Commission. The Commission grants authorization to sell power at market-based rates if the power marketer adequately demonstrates that it and its affiliates lack or have mitigated market power in the relevant markets. FERC conditions market-based rate authority on power marketers submitting quarterly reports of their purchase and sales activities and complying with certain restrictions for the protection of captive

customers against affiliate abuse. There are currently 1200 electric power marketers authorized to sell energy at market-based rates.

The Commission generally grants waiver of certain regulations to power marketers which receive market-based rate authorization. For example, these marketers do not need to submit cost-of-service filings because the rates they charge are market-based. The Commission also exempts power marketers from its accounting requirements, because those requirements are designed to collect the information used in setting cost-based rates. In addition, unless others object, FERC grants power marketers' requests for blanket approval for all future issuances of securities and assumptions of liability.

Because the Commission's reporting and accounting requirements are designed to address a limited set of concerns, and apply only to the jurisdictional subsidiary at issue, it is unlikely that requiring power marketers to comply with these requirements could prevent a future Enron-like failure. Nevertheless, in our current rulemaking proceeding on accounting rules, we have invited comments on whether the current exemptions for power marketers from such requirements remain appropriate.

B. Electric Utilities

A few years ago Enron acquired Portland General Electric (PGE), a vertically-integrated utility subsidiary of Enron that handles electricity generation, purchase, transmission, distribution and sale in eastern Oregon. PGE's retail rates and practices are under the jurisdiction of the Oregon Public Utility Commission. PGE also sells energy to wholesale customers in the western United States. FERC has granted market-based rate authorization to PGE for certain wholesale sales. Although the Commission waives some of its reporting requirements for power marketers, it requires continued reporting from franchised electric utilities such as PGE, so we can monitor whether its wholesale transactions are inappropriately favoring its affiliates or harming its captive customers. Although Enron's collapse has had tragic impacts upon PGE's employee retirement accounts, we have not yet seen any negative impacts on PGE's ability to meet its obligations to customers as a result of the Enron bankruptcy. I should also observe that the sale of PGE to Northwest Natural, announced prior to Enron's collapse, is pending before FERC and other regulatory bodies.

C. Gas Pipeline Subsidiaries

The Commission has limited jurisdiction over sales for resale of natural gas in interstate commerce. The Commission has jurisdiction to regulate only sales for resale of domestic gas by pipelines, local distribution companies (LDCs), and their affiliates.

Consistent with the Congressional goal of allowing competition in natural gas markets, the Commission does not prescribe the prices for these sales.

The Commission has authority over the rates, terms and conditions for pipeline transportation in interstate commerce of natural gas and oil. The Commission regulates several natural gas pipeline affiliates of Enron, namely, Florida Gas Transmission, Midwestern Gas Transmission, Northern Border Pipeline Company, Transwestern Pipeline Company, and Northern Natural Gas Company.

D. Transactions and Activities Not Regulated by the Commission

The Federal Power Act does not give the Commission direct, explicit jurisdiction over purely financial transactions, such as futures contracts for electricity or natural gas. The Commission has asserted jurisdiction over such transactions only when they result in physical delivery of the energy which is the subject of the financial contract, or when such transactions or contracts affect or relate to jurisdictional services or rates (e.g., financial contracts affecting firm rights to interstate transmission capacity or the pricing of such capacity).¹ While Enron and its subsidiaries engaged in many electricity futures contracts and other energy-related derivatives, it does not appear that these transactions have played a significant role in Enron's demise.

IV. FERC Initiatives in Energy Markets

In response to rapidly evolving energy markets, the Commission has implemented a number of new initiatives to improve its market-monitoring abilities. The Commission's new strategic plan, adopted September 26, 2001, encompasses three major areas of activity in overseeing the energy industry:

- Infrastructure – working with others to anticipate the need for new generation and transmission facilities, determining the rules for cost recovery of new energy

¹In 1996, the Commission addressed the issue of whether an electricity futures contract approved for trading by the CFTC would fall under its jurisdiction, pursuant to the FPA. New York Mercantile Exchange, 74 FERC ¶ 61,311 (1996). The Commission found that the CFTC possessed exclusive jurisdiction over the trading of such futures contracts, and that the Commission would assert jurisdiction, pursuant to the FPA, only if the electricity futures contract goes to delivery, the electric energy sold under the contract will be resold in interstate commerce, and the seller is a public utility. *Id.* at 61,986.

infrastructure, encouraging the construction of new infrastructure, and licensing or certificating hydroelectric facilities and natural gas pipelines;

- Market rules – ensuring clear, fair market rules to govern wholesale competition that benefits all participants, and assure non-discriminatory transmission access in the electric and natural gas industries;
- Market oversight and investigation – understanding markets and remedying market rule violations and abuse of market power.

This last, third strategic goal is new, and reflects the present Commission's commitment to ensuring that markets continue to work for customers. The strategic plan is available on our website at www.ferc.gov.

To give substance to this third strategic goal, the Commission is creating a new Office of Market Oversight and Investigation (MOI), which will concentrate the Commission's market-monitoring resources into one workgroup and enable the Commission to better understand and track wholesale energy markets and risk management by analyzing market data, measuring market performance, investigating compliance violations, and, where necessary, pursuing enforcement actions. MOI's work will provide an early warning system to alert the Commission of potentially negative market developments and let us act more proactively to address any problems that may arise. We are currently taking applications for the Director of this Office, who will report directly to me.

In mid-2001 the Commission created the Market Observation Resource Center (MOR) to better observe market developments and to enable us to grasp quickly the significance of changes in market conditions. MOR's computer hardware, software and subscription web services give us access to historical and real-time data about energy markets.

The Commission has launched several other initiatives within the past year to ensure vigilant and fair oversight of the changing energy markets. In July 2001, the Commission proposed in a rulemaking to amend the filing requirements for public utilities. The proposal would require all generators, public utilities and power marketers to file electronically with the Commission and post on the Internet an index of customers with a summary of the contractual terms and conditions for market-based power sales, cost-based power sales, and transmission service. These companies would also have to report transaction information for short-term and long-term market-based power sales and cost-based power sales during the most recent calendar quarter. This proposal will give the Commission and the public more complete and accessible information on jurisdictional transactions.

In September 2001, the Commission proposed in a rulemaking to revise its restrictions on the relationships between regulated transmission providers (such as Portland General Electric) and their energy affiliates, broadening the definition of an affiliate to include newer types of affiliates, such as affiliated trading platforms (e.g., EnronOnline).

Also, in September 2001, the Commission staff began a comprehensive review of the information the Commission needs to carry out its statutory obligations in the current and evolving markets in electricity and natural gas. Presently, much of the information we require relates to the historic rate-setting functions of the agency. The review so far indicates that some of this may no longer be necessary, while other information is now more essential to provide transparency in a competitive marketplace.

In December 2001, the Commission proposed in a rulemaking to update the accounting and reporting requirements for jurisdictional public utilities, natural gas companies and oil pipelines. FERC proposes to establish uniform accounting requirements and related accounts for the recognition of changes in the fair value of certain security investments, items of other comprehensive incomes, derivative instruments, and hedging activities. The proposal is aimed at improving the visibility, completeness and consistency of accounting and reporting changes for these items. It invites comments on whether entities that are currently exempted from these accounting and reporting requirements, such as power marketers, should be subject to these proposed regulations.

While I have an open mind on whether the Commission should continue to exempt power marketers from its accounting requirements, our accounting requirements are not aimed at the kind of activities allegedly undertaken by Enron. Based on our historical responsibilities, FERC's accounting requirements are focused on providing useful and accurate information for determining cost-based rates. Cost-based ratemaking encourages utilities to maximize their claimed costs and minimize their expected revenues, to justify the highest possible rates. The Commission's accounting rules and auditing are designed to ensure that utilities with cost-based rates do not overstate costs or understate revenues. On January 22, 2001, the Securities and Exchange Commission proposed additional accounting-related disclosures from a broad universe of companies, including those exempt from FERC's reporting requirements. Adoption of that proposal could eliminate the need for the FERC to alter its reporting requirements in this regard.

V. Additional Statutory Authority

Before we can understand how to prevent another Enron-like collapse, we must first understand what internal actions and external events caused Enron to fail. That effort is now underway by this Committee and elsewhere. Then we must ask whether those actions and events can and should be prevented in the future.

Whether the Commission needs any additional statutory authority depends on the role Congress intends for the Commission. Historically, the Commission's economic regulation has focused on ensuring that energy markets deliver adequate energy at reasonable prices. The demise of Enron has had little or no effect on the supply or price of energy. Instead, Enron's collapse has primarily harmed its investors and employees. Since it appears that few of Enron's problems affected the narrow scope of wholesale energy markets, it is not clear that giving the Commission additional authority within its current scope would prevent further Enron-like problems.

To encourage greater efficiencies in the energy markets and to ensure that wholesale competition expands its ability to deliver reasonably priced, adequate energy supplies to more customers, the Commission is moving forward to complete its effort to create competitive national wholesale power markets as it did with natural gas markets in the late 1980s and early 1990s. Congress endorsed wholesale power competition in the Energy Policy Act of 1992 and further endorsement of this effort would certainly be helpful. In particular, Congress should give the Commission explicit authority to require regional transmission organizations (RTOs) where it finds RTOs to be in the public interest. RTOs will broaden regional energy markets, allowing greater market efficiencies and limiting possible discrimination in grid operations. Congress should also remove tax disincentives to transferring transmission assets to RTOs and to use of public power transmission lines.

Price Transparency

Greater price transparency will help improve the efficiency of energy markets, by providing buyers and sellers with better information about market conditions. The creation and operation of broad regional energy markets with a widely-traded set of energy products will do much to make this happen. Once RTOs over broad regional markets are established, operating under fair, clear, stable market rules, price transparency will improve significantly, even without a Congressional mandate. This has already happened to an extent in the regions now served by Independent System Operators (ISOs).

The Commission is moving forward with further transparency, as discussed above. Without question, Congressional endorsement of this effort would be helpful. Proposed Senate legislation, S. 1766, would improve market transparency through better electronic

dissemination of information about trades in the energy markets and the transfer capabilities of the transmission infrastructure. These measures will help the Commission establish sound competitive wholesale markets by validating and broadening the agency's authority to compel such reporting and information dissemination. They will also help FERC and financial market regulators and players to better monitor individual companies' participation and diminish the ability of any individual player to misbehave or misrepresent in the marketplace.

I offer two cautions, however:

- First, while the transparency provisions of S. 1766 address actual trades, they do not appear to address at least two of the issues at the heart of Enron's situation – how they handled and reported the risks and valuation underlying the trades they were conducting, and how they represented the value of the trades flowing through their platforms as corporate revenue. Those are broader financial reporting and regulation issues that are outside the scope of FERC's jurisdiction.
- Second, there is a difficult balance between information that must be disclosed to make markets work and information that is commercially proprietary. It is clearly to the public benefit to implement rules that disclose more information and improve market transparency, but it is not always easy in practice to find the appropriate point between reasonable information disclosure and protection.

But these reservations do not detract from the value that a provision like Section 208 of S. 1766 may bring to the nation's energy markets, and I support adoption of an appropriate transparency provision.

Creditworthiness

The responsibility for ensuring creditworthiness of participants in wholesale energy trades lies primarily with the parties involved in those trades. Creditworthiness provisions are included in some contracts or tariffs filed at the Commission to date, and the Commission is likely to include some broad creditworthiness provisions in the standard tariffs that will be developed for all transmission providers and customers (to prevent the use of individual creditworthiness terms as discriminatory measures in narrow geographic areas or against specific players). But, market participants seem best equipped to develop sophisticated risk management measures and narrow creditworthiness concerns, and those provisions may be subject to Commission review for justness and reasonableness.

To the extent creditworthiness issues are raised before the Commission, we act expeditiously. For example, shortly after Enron declared bankruptcy, the Participants Committee of the New England Power Pool (NEPOOL) sought to implement alternative payment and financial assurance arrangements with Enron Power Marketing Inc., Enron Energy Marketing Corporation, and Enron Energy Services, Inc. Within a week of the date of filing, the Commission accepted and suspended these arrangements (subject to review of the finalized agreement), to protect NEPOOL participants while enabling the Enron subsidiaries to stay in the market and continue serving their customers.

I do not think there is any need to legislatively address creditworthiness issues specific to energy markets.

Public Utility Holding Company Act

If Congress' policy goal is to promote wholesale energy competition and new infrastructure construction, then reform of the Public Utility Holding Company Act of 1935 (PUHCA), supplemented with increased access by the Commission and state regulators to certain books and records, will help energy customers. Energy markets have changed dramatically since enactment of PUHCA, and competition, where it exists, is often a more effective constraint on energy prices. In the 65 years since PUHCA was enacted, much greater state and federal regulation of utilities and greater competition have diminished any contribution PUHCA may make toward protecting the interests of utility customers. State and federal ratemaking proceedings, for example, are very effective in ensuring that activities of unregulated businesses do not increase regulated rates. For this reason, the provisions of S. 1766 which give broad access to a regulated company's holding company's books and records is important if PUHCA is to be repealed. But some have argued that certain provisions of PUHCA may remain valuable in protecting the interests of shareholders and employees in other regards, and I defer to others on that point.

As always, I will be happy to provide further information or answer any questions you may have and offer the services of my colleagues and staff to the Committee's efforts.

**Summary of Testimony of
Pat Wood, III
Chairman, Federal Energy Regulatory Commission
Before the Subcommittee on Energy and Air Quality
of the Committee on Energy and Commerce
United States House of Representatives
February 13, 2002**

Enron's bankruptcy has stunned both the energy and investor communities, and many employees and retirees saw their savings accounts all but vanish. But Enron's collapse has not caused significant damage to the nation's energy trading or energy supplies; prices in energy markets remained stable. And most important, there have been few disruptions to the deliveries of electricity and gas. The nation's electric and natural gas markets' resilience following the collapse of one of its major participants indicates a high degree of robustness and efficiency.

Did energy markets and the growing trend toward competition cause or contribute to Enron's collapse? No. It is not the fault of the energy markets that Enron's business strategy may have been successful only in markets with rising prices. Prices are cyclical in most commodity industries, and an effective strategy must be designed to work in the rain as well as the sunshine. It appears that Enron made misjudgments and misrepresentations which undercut investor confidence and led to its failure; Enron's actions cannot be blamed on the energy industry.

Based on recent allegations that Enron may have manipulated electric and gas markets, the Commission's staff has begun a fact-finding investigation. The staff team has access to whatever resources they will need to conduct their investigation. Upon receiving the staff's fact-finding report, the Commission will determine how to proceed on any pending or future FPA section 206 complaints, or whether to institute formal section 206 investigations on our own motion, into long-term power contracts whose prices may have been influenced by any inappropriate Enron activities.

To prevent or mitigate Enron-like debacles in the future, Congress should continue to support and enhance fair and effective wholesale competition in the electric and gas markets. Such competition lowers costs and improves reliability for all customers. To achieve this goal, Congress should clarify the Commission's authority over transmission utility participation in regional transmission organizations (RTOs) and over greater disclosure and transparency of market information in these emerging competitive markets.

**Testimony of
Pat Wood, III
Chairman, Federal Energy Regulatory Commission
Before the Subcommittee on Energy and Air Quality
of the Committee on Energy and Commerce
United States House of Representatives
February 13, 2002**

I. Introduction and Summary

Mr. Chairman and Members of the Subcommittee:

Chairman Barton has asked me to answer three questions: Did Enron's collapse shake energy markets? Conversely, did energy markets contribute to Enron's collapse? And is there anything that Congress should do, relating to energy markets, to repair or prevent such problems in the future? I thank you for the opportunity to address these questions with you today.

The bankruptcy of one of the largest energy providers in the country has stunned both the energy and investor communities, and many employees and retirees saw their savings accounts all but vanish. But the collapse of Enron has not caused significant damage to the nation's energy trading or energy supplies. In the aftermath of Enron's collapse, prices in energy markets remained stable, trading within expected trading ranges. And most important, there have been few disruptions to the deliveries of electricity and gas, except for a few isolated incidents where Enron subsidiaries have not been able to honor their delivery commitments to end use customers. The Federal Energy Regulatory Commission (Commission or FERC) has monitored the effects of Enron's collapse on energy markets and has not found any substantial spillover effects. The nation's electric and

natural gas markets' resilience following the swift collapse of one of its major participants indicates a high degree of robustness and efficiency.

Did energy markets and the growing trend toward competition cause or contribute to Enron's collapse? No. Enron was trying to bring its strategy of asset-light, trading platform leverage beyond energy markets into a variety of commodities and markets, including broadband, water, and others. While Enron may have developed the strategy first in gas and then in electricity markets, it is not the fault of the energy markets that Enron's business strategy may only have been successful in markets with rising prices. Prices are cyclical in most commodity industries, and an effective strategy must be designed to work in the rain as well as the sunshine. Similarly, it appears that Enron made a number of misjudgments and misrepresentations in its financial and accounting practices which undercut investor confidence and led to its failure. Enron's actions cannot be blamed upon the energy industry.

I disagree with those who claim that the Enron collapse sounds the death knell for competition in energy markets or justifies nationwide reimposition of traditional cost-based regulation of electricity. The facts available to date indicate that Enron's failure had little or nothing to do with whether energy commodities and their delivery to customers are monopoly regulated or competitive. Rather, Enron appears to have failed because of its questionable non-core business investments and the manner in which it reported on its financial position to its owner-investors and to the broader business

community. Based on the facts as they appear now, Enron's actions would have led to the same result whether its core business focused on energy, grains, metals or books.

You may be aware that members of the Senate Energy and Natural Resources Committee have asked the Commission to formally investigate allegations that Enron may have exercised inappropriate influence on the nation's electric and gas markets. A comprehensive staff fact-finding investigation has begun. The staff team has access to whatever resources they will need to conduct an independent investigation, including many of our best people and whatever consulting assistance they determine is necessary. Because the FERC's responsibility and jurisdiction lies primarily in the physical assets markets rather than in the financial assets markets where so many of Enron's activities occurred, we are also consulting with our colleagues at the CFTC, SEC, DOJ, and FTC to gain their insights into how to understand and analyze these markets. An investigation of this magnitude is neither easy nor fast, so it may take several months before staff has completed its work and presents its results to the Commission, the Congress, and American energy customers. Based on the information in the fact-finding report, the Commission will determine how to proceed on any pending or future FPA section 206 complaints, or whether to institute formal section 206 investigations on our own motion, into long-term power contracts whose prices may have been influenced by any inappropriate Enron activities.

Last, what should Congress do, related to energy markets, to ensure that a future Enron disaster is prevented or mitigated? You can support and enhance the initiatives you

have already encouraged to promote fair and effective wholesale competition in the electric and gas markets, because such competition lowers costs and improves reliability for all customers. To achieve this goal, you could clarify the Commission's authority over transmission utility participation in RTOs and over greater disclosure and transparency of market information in these emerging competitive markets.

I will address all these matters in greater detail in the comments below.

II. Enron's Impact on Gas and Electric Markets

Enron's collapse had little perceptible impact on the nation's physical commodity (wholesale) electric and gas markets, which are FERC's primary regulatory responsibility. Energy markets have adjusted quickly to Enron's collapse. The Commission's monitoring of the physical energy markets indicates that there has been no immediate damage to energy trading or energy supplies. Although Enron transactions comprised 15 to 20 percent of wholesale energy trades, its demise has had negligible effects on trading. With a few exceptions, parties were generally able to rearrange the deals they had executed with Enron.

Market Monitoring and Reactions

From late October 2001, when news of a likely formal investigation of Enron and its auditors by the SEC first became known, to early December 2001, after Enron's declaration of bankruptcy, spot market data indicates that there was no change in natural gas or electric wholesale prices that could not be attributed to weather or other fundamentals. As may be

expected, Enron's swift exit from trading may have increased volatility somewhat. Our staff is currently investigating this concern more thoroughly.

Following the news of a formal SEC investigation of Enron in October 2001, Commission staff contacted market participants to learn whether any supply obligations might be in jeopardy. Staff began monitoring EnronOnline more closely, particularly any changes in the margins between the bid-ask prices on EnronOnline, as a widening of these bid-ask spreads might signal less liquidity in the market; but there was no significant change in the margin between the bid and ask prices on EnronOnline.

Commission staff also contacted counterparties and received assurances from them that they were adjusting to Enron by "shortening" their positions and not entering into longer-term arrangements with Enron. In mid-November, when it appeared that the Dynegy merger with Enron might be jeopardized, staff observed no significant change in the margin between the bid and ask prices on EnronOnline; at the same time, there was a marked increase in the volume traded on other online trading platforms, such as Dynegydirect and Intercontinental Exchange (ICE). Commission staff again contacted energy traders to determine whether major supply disruptions in wholesale markets were occurring, and was informed that Enron had "flattened its books," i.e., made its portfolio of trades neither long nor short so that it could more easily "step out" of transactions and not cause disruption. As events unfolded in late November and early December, other market participants stepped into these deals. With the exception of certain lightly-traded points, it appears that Enron's competitors have filled the void left behind by Enron.

The reason for this overall calmness in commodity prices is basic. Although Enron was a significant player in electric and gas markets--as a pipeline, as a commodity trader, as a futures contract trader, and as a market maker--there were many other players in these large, established commodity markets, and a great deal of market diversity. Once it became apparent that Enron might not be a stable counterparty, its trading partners began to systematically adjust their positions and practices in the marketplace, moving to other trading platforms and partners. A similar process occurred among the counterparties to Enron's longer-term, untraded gas and electric contracts. Thus, over only a few weeks time, the gas and electric markets systematically minimized Enron's role in the marketplace and the likelihood that a company-specific failure could significantly affect the underlying commodities. I believe the calm but vigilant reaction of the CFTC, among others, during this period allowed time for this unwinding to take place.

The flexibility of today's energy markets allows a buyer losing its supply to replace the energy in real-time (at least briefly) through imbalance services offered by transportation providers. With more time, such as an hour or more before a supply will be lost, a buyer generally can arrange alternative supplies from a wide range of sources. Thus, the risk of a buyer having insufficient energy because of a seller's default appears to be manageable, as evidenced by the recent experience with Enron.

The more substantial risk in these circumstances is the loss of an advantageous contractual price for energy. Even this risk, however, depends on market conditions. When a seller defaults, market conditions for buying energy may be better or worse than when a

buyer entered into its contract with the seller. If better, the buyer actually may benefit from not having to buy under the existing contract and instead being able to buy at lower prices elsewhere.

Enron's market role

Enron's role in the gas and electric markets was primarily in the trading of financial assets (commodity and futures contracts) rather than physical assets (with the exception of its natural gas pipelines, which continued operation relatively untouched by the events affecting the parent and affiliated companies). Less than 10 percent of the contracts traded in these markets involve the initial producer or final wholesale customer for the physical product, whereas well over 90 percent of commodity contracts and futures are between intermediate holders who are managing risk and facilitating connections between initial producers and ultimate customers. Adjustments in the financial asset marketplace--as to the length of a contract or the identities of the counterparties--rarely affect the flow of the physical gas and electricity underlying those contracts. Thus, while the commodity markets were shortening the length of contracts and moving more trade to non-Enron partners, gas and electric deliveries continued unaffected.

Enron controls a number of natural gas pipelines, but its financial failure has had little apparent impact on their operations. But even if it had, it is worth noting that the gas and electric markets have demonstrated their ability to react to and manage around problems that could affect their ability to deliver electricity and gas. When a pipeline breaks, a compressor station fails, a transmission line collapses, or a large power plant

goes off-line, the parties in the market adjust immediately to acquire other supplies and delivery routes. A sufficiently robust energy infrastructure makes this possible. In these instances, prices may well rise and, occasionally, deliveries to retail customers may be slowed but the wholesale market reacts swiftly and minimizes the impact to wholesale and retail customers alike.

In response to the Enron crisis, Moody's has raised the credit standards for generators and traders. This has forced energy concerns to rebalance their debt-to-asset ratios, forcing many to reduce debt and cut back investments in new gas processing, pipelines and power plants. During December 2001, stock prices of several energy companies hit yearly lows. Enron's problems, in combination with the recession and reports of potential overbuilding, appear to have eroded confidence, making investors more cautious about putting money into the energy industry. This slowdown in infrastructure investment could be problematic in some regions as the economy recovers and demand for energy grows. For that reason, the Commission has accelerated its efforts to complete the transition to a more competitive wholesale power market in order to provide investment certainty.

Enron and Competition

The markets' reaction to Enron's collapse demonstrates what good, working competitive markets do best: a diverse group of market participants with adequate market information about the players and commodities act individually to produce a result that works for all. The nation's wholesale electric and gas markets showed great resilience and

swift reaction time, and demonstrated that they are much stronger than any individual player in the marketplace.

Some claim that Enron's demise is due to the failure of deregulation and competition in the electric industry, of which Enron was one of many supporters. I strongly disagree. Wholesale competition in the gas industry has spurred gas production, encouraged pipeline construction, driven down commodity prices for the past decade and lowered retail prices accordingly. In the electric sector, wholesale competition, although still in its infancy, has enabled the construction of thousands of megawatts of new power plant capacity across the country, producing lower commodity and retail electric prices in most regions, and in a cleaner generation fleet.

III. The Commission's Regulation of Enron Subsidiaries

The Commission does not regulate the parent corporation, Enron Corporation, as it does not engage in activities which are under FERC jurisdiction. FERC does regulate a number of Enron's subsidiaries. Our authority with respect to the Enron subsidiaries subject to our jurisdiction is described below.

The Commission has jurisdiction over sales for resale of electric energy and transmission service provided by public utilities in interstate commerce. The Commission has interpreted the Federal Power Act to include energy marketers as well as traditional vertically integrated electric utilities in its definition of public utilities. The Commission must ensure that the rates, terms and conditions of wholesale energy and transmission services by public utilities are just, reasonable, and not unduly discriminatory or

preferential. FERC also is responsible for reviewing proposed mergers, acquisitions and dispositions of jurisdictional facilities by public utilities, and must approve such transactions if they are consistent with the public interest. We also regulate the issuance of securities and the assumption of liabilities by public utilities not regulated by States.

The Commission also has jurisdiction over sales for resale of natural gas and transportation. However, FERC jurisdiction over sales for resale is limited to domestic gas sold by pipelines, local distribution companies, and their affiliates (including energy marketers). Consistent with Congressional intent, the Commission does not prescribe prices for these sales.

A. Energy Marketers

Competitive trading of energy by "marketers" generally began about two decades ago. Marketers do not usually own physical facilities, but take title to energy and re-sell it at market-based rates. Natural gas marketing began with the deregulation of the price of natural gas in 1978 and expanded with the Commission's 1992 open access rule for natural gas pipelines, Order No. 636. In the decade since Order No. 636, natural gas marketing has developed into a large, robust activity with many marketers. The Commission lacks jurisdiction over sales of natural gas by many gas marketers. To maximize competition we have granted "blanket authorization" for those marketers under FERC jurisdiction so they do not have to file for and obtain individual approvals to sell gas at wholesale.

In the electric arena, wholesale power marketers began selling electric energy as early as 1986. The Energy Policy Act of 1992, and the Commission's 1996 open access

rule for electric transmission owners and operators, Order No. 888, further spurred the development of competitive electric power trading.

The Enron-affiliated power marketers regulated by the Commission include: Enron Power Marketing Inc., Enron Sandhill Limited Partnership, Milford Power Limited Partnership, Enron Energy Services, Inc., and Enron Marketing Energy Corporation.

EnronOnline

Before its collapse, Enron was the largest marketer of natural gas and electric power. Enron's Internet-based trading system, EnronOnline, was until recently the dominant Internet-based platform for both physical energy (electricity and natural gas products) and energy derivatives. (Derivatives are financial instruments based on the value of one or more underlying stocks, bonds, commodities, or other items. Derivatives involve the trading of rights or obligations based on the underlying product, but do not directly transfer property.) Although EnronOnline was the leading Internet-based trading platform for natural gas and electric power, it faced competition from other Internet-based trading platforms, such as Dynegydirect and Intercontinental Exchange (ICE).

Traditional exchanges, like the NYSE and the NYMEX, determine price by matching the buy and sell orders of many traders in a many-to-many trading format. In contrast, EnronOnline uses a one-to-many trading format, where an Enron affiliate is always on one side of each energy transaction, either as a seller or a buyer. The price of a commodity or derivative on EnronOnline is determined when a buyer or a seller accepts an offer or bid price posted by an Enron trader. In the wake of Enron's downfall, the many-to-many

platforms such as ICE have helped to fill the void, and create a more robust market by reflecting the bid and offer values of myriad different energy buyers and sellers.

Market-based Rate Authorization

To sell electricity at market-based rates, public utilities (including power marketers) must file an application with the Commission. The Commission grants authorization to sell power at market-based rates if the power marketer adequately demonstrates that it and its affiliates lack or have mitigated market power in the relevant markets. FERC conditions market-based rate authority on power marketers submitting quarterly reports of their purchase and sales activities and complying with certain restrictions for the protection of captive customers against affiliate abuse. There are currently 1200 electric power marketers authorized to sell energy at market-based rates.

The Commission generally grants waiver of certain regulations to power marketers which receive market-based rate authorization. For example, these marketers do not need to submit cost-of-service filings because the rates they charge are market-based. The Commission also exempts power marketers from its accounting requirements, because those requirements are designed to collect the information used in setting cost-based rates. In addition, unless others object, FERC grants power marketers' requests for blanket approval for all future issuances of securities and assumptions of liability.

Because the Commission's reporting and accounting requirements are designed to address a limited set of concerns, and apply only to the jurisdictional subsidiary at issue, it is unlikely that requiring power marketers to comply with these requirements could prevent

a future Enron-like failure. Nevertheless, in our current rulemaking proceeding on accounting rules, we have invited comments on whether the current exemptions for power marketers from such requirements remain appropriate.

B. Traditional Electric Utilities

A few years ago Enron acquired Portland General Electric (PGE), a vertically-integrated utility subsidiary of Enron that handles electricity generation, purchase, transmission, distribution and sale in eastern Oregon. PGE's retail rates and practices are under the jurisdiction of the Oregon Public Utility Commission. PGE also sells energy to wholesale customers in the western United States. FERC has granted market-based rate authorization to PGE for certain wholesale sales. Although the Commission waives some of its reporting requirements for power marketers, it requires continued reporting from franchised electric utilities such as PGE, so we can monitor whether its wholesale transactions are inappropriately favoring its affiliates or harming its captive customers. Although Enron's collapse has had tragic impacts upon PGE employees' retirement accounts, we have not yet seen any negative impacts on PGE's ability to meet its obligations to customers as a result of the Enron bankruptcy. I should also observe that the sale of PGE to Northwest Natural, announced prior to Enron's collapse, is pending before FERC and other regulatory bodies.

C. Gas Pipeline Subsidiaries

The Commission has limited jurisdiction over sales for resale of natural gas in interstate commerce. The Commission has jurisdiction to regulate only sales for resale of

domestic gas by pipelines, local distribution companies (LDCs), and their affiliates.

Consistent with the Congressional goal of allowing competition in natural gas markets, the Commission does not prescribe the prices for these sales.

The Commission has authority over the rates, terms and conditions for pipeline transportation in interstate commerce of natural gas and oil. The Commission-regulated natural gas pipeline affiliates of Enron include: Florida Gas Transmission, Midwestern Gas Transmission, Northern Border Pipeline Company, Transwestern Pipeline Company, and Northern Natural Gas Company.

D. Transactions and Activities Not Regulated by the Commission

The Federal Power Act does not give the Commission direct, explicit jurisdiction over purely financial transactions, such as futures contracts for electricity or natural gas. The Commission has asserted jurisdiction over such transactions only when they result in physical delivery of the energy which is the subject of the financial contract, or when such transactions or contracts affect or relate to jurisdictional services or rates (e.g., financial contracts affecting firm rights to interstate transmission capacity or the pricing of such capacity).¹ While Enron and its subsidiaries engaged in many electricity futures contracts

¹In 1996, the Commission addressed the issue of whether an electricity futures contract approved for trading by the CFTC would fall under its jurisdiction, pursuant to the FPA. New York Mercantile Exchange, 74 FERC ¶ 61,311 (1996). The Commission found that the CFTC possessed exclusive jurisdiction over the trading of such futures contracts, and that the Commission would assert jurisdiction, pursuant to the FPA, only if the electricity futures contract goes to delivery, the electric energy sold under the contract will be resold in interstate commerce, and the seller is a public utility. *Id.* at 61,986.

and other energy-related derivatives, it does not appear that these transactions have played a significant role in Enron's demise.

IV. FERC Initiatives in Energy Markets

In response to rapidly evolving energy markets, the Commission has implemented a number of new initiatives to improve its market-monitoring abilities. The Commission's new strategic plan, adopted September 26, 2001, encompasses three major areas of activity in overseeing the energy industry:

- Infrastructure - working with others to anticipate the need for new generation and transmission facilities, determining the rules for cost recovery of new energy infrastructure, encouraging the construction of new infrastructure, and licensing or certificating hydroelectric facilities and natural gas pipelines;
- Market rules - ensuring clear, fair market rules to govern wholesale competition that benefits all participants, and assuring non-discriminatory transmission access in the electric and natural gas industries;
- Market oversight and investigation - understanding markets and remedying market rule violations and abuse of market power.

This third strategic goal is new, and reflects the present Commission's commitment to ensuring that markets continue to work for customers. The strategic plan is available on our website at www.ferc.gov.

To give substance to this third strategic goal, the Commission is creating a new Office of Market Oversight and Investigation (MOI), which will concentrate the

Commission's market-monitoring resources into one workgroup and enable the Commission to better understand and track wholesale energy markets and risk management by analyzing market data, measuring market performance, investigating compliance violations, and, where necessary, pursuing enforcement actions. MOI's work will provide an early warning system to alert the Commission of potentially negative market developments and let us act more proactively to address any problems that may arise. We are currently taking applications for the Director of this Office, who will report directly to me and the other commissioners.

In mid-2001, the Commission created the Market Observation Resource Center (MOR) to better observe market developments and to enable us to grasp quickly the significance of changes in market conditions. MOR's computer hardware, software and subscription web services give us access to historical and real-time data about energy markets.

The Commission has launched several other initiatives within the past year to ensure vigilant and fair oversight of the changing energy markets. In July 2001, the Commission proposed in a rulemaking to amend the filing requirements for public utilities. The proposal would require all generators, public utilities and power marketers to file electronically with the Commission and post on the Internet an index of customers with a summary of the contractual terms and conditions for market-based power sales, cost-based power sales, and transmission service. These companies would also have to report transaction information for short-term and long-term market-based power sales and

cost-based power sales during the most recent calendar quarter. This proposal will give the Commission and the public more complete and accessible information on jurisdictional transactions.

In September 2001, the Commission proposed in a rulemaking to revise its restrictions on the relationships between regulated transmission providers (such as Portland General Electric) and their energy affiliates, broadening the definition of an affiliate to include newer types of affiliates, such as affiliated trading platforms (e.g., EnronOnline).

Also, in September 2001, the Commission staff began a comprehensive review of the information the Commission needs to carry out its statutory obligations in the current and evolving markets in electricity and natural gas. Presently, much of the information we require relates to the historic rate-setting functions of the agency. The review so far indicates that some of this may no longer be necessary, while other information is now more essential to provide transparency in a competitive marketplace. This is a high priority initiative.

In December 2001, the Commission proposed in a rulemaking to update the accounting and reporting requirements for jurisdictional public utilities, natural gas companies and oil pipelines. FERC proposes to establish uniform accounting requirements and related accounts for the recognition of changes in the fair value of certain security investments, items of other comprehensive incomes, derivative instruments, and hedging activities. The proposal is aimed at improving the visibility, completeness and consistency

of accounting and reporting changes for these items. It invites comments on whether entities that are currently exempted from these accounting and reporting requirements, such as power marketers, should be subject to these proposed regulations.

While I have an open mind on whether the Commission should continue to exempt power marketers from its accounting requirements, our accounting requirements are not aimed at the kind of activities allegedly undertaken by Enron. Based on our historical responsibilities, FERC's accounting requirements are focused on providing useful and accurate information for determining cost-based rates. Cost-based ratemaking encourages utilities to maximize their claimed costs and minimize their expected revenues, to justify the highest possible rates. The Commission's accounting rules and auditing are designed to ensure that utilities with cost-based rates do not overstate costs or understate revenues. On January 22, 2001, the SEC proposed additional accounting-related disclosures from a broad universe of companies, including those exempt from FERC's reporting requirements. Adoption of that proposal could eliminate the need for the FERC to alter its reporting requirements in this regard.

V. Additional Statutory Authority

Before we can understand how to prevent another Enron-like collapse, we must first understand what internal actions and external events caused Enron to fail. That effort is now underway by this Subcommittee and elsewhere. Then we must ask whether those actions and events can and should be prevented in the future.

Whether the Commission needs any additional statutory authority depends on the role Congress intends for the Commission. Historically, the Commission's economic regulation has focused on ensuring that energy markets deliver adequate energy at reasonable prices. The demise of Enron has had little or no effect on the supply or price of energy. Instead, Enron's collapse has primarily harmed its investors and employees. Since it appears that few of Enron's problems affected the narrow scope of wholesale energy markets, it is not clear that giving the Commission additional authority within its current scope would prevent further Enron-like problems.

To encourage greater efficiencies in the energy markets and to ensure that wholesale competition expands its ability to deliver reasonably priced, adequate energy supplies to more customers, the Commission is moving forward to complete its effort to create competitive national wholesale power markets as it did with natural gas markets in the late 1980s and early 1990s. Congress endorsed wholesale power competition in the Energy Policy Act of 1992 and further endorsement of this effort would certainly be helpful. In particular, Congress should give the Commission explicit authority to require RTOs where it finds them to be in the public interest. RTOs will broaden regional energy markets, allowing greater market efficiencies and limiting possible discrimination in grid operations. Congress should also remove tax disincentives to transferring transmission assets to RTOs and to use of public power transmission lines.

Price Transparency

Greater price transparency will help improve the efficiency of energy markets, by providing buyers and sellers with better information about market conditions. The creation and operation of broad regional energy markets with a widely-traded set of energy products will do much to make this happen. Once RTOs over broad regional markets are established, operating under fair, clear, stable market rules, price transparency will improve significantly, even without a Congressional mandate. This has already happened to an extent in the regions now served by Independent System Operators (ISOs) in the Northeastern part of the country.

The Commission is moving forward with greater transparency, as discussed above. Without question, Congressional endorsement of this effort would be helpful. I support adoption of an appropriate transparency provision.

Creditworthiness

The responsibility for ensuring creditworthiness of participants in wholesale energy trades lies primarily with the parties involved in those trades. Creditworthiness provisions are included in some contracts or tariffs filed at the Commission to date, and the Commission is likely to include some broad creditworthiness provisions in the standard tariffs that will be developed for all transmission providers and customers (to prevent the use of individual creditworthiness terms as discriminatory measures in narrow geographic areas or against specific players). However, market participants seem best equipped to develop sophisticated risk management measures and narrow creditworthiness concerns,

and those provisions may be subject to Commission review for justness and reasonableness.

To the extent creditworthiness issues are raised before the Commission, we act expeditiously. For example, shortly after Enron declared bankruptcy, the Participants Committee of the New England Power Pool (NEPOOL) sought to implement alternative payment and financial assurance arrangements with Enron Power Marketing Inc., Enron Energy Marketing Corporation, and Enron Energy Services, Inc. Within a week of the date of filing, the Commission accepted and suspended these arrangements (subject to review of the finalized agreement), to protect NEPOOL participants while enabling the Enron subsidiaries to stay in the market and continue serving their customers.

I do not think there is any need to legislatively address creditworthiness issues specific to energy markets.

VI. Conclusion

As always, I will be happy to provide further information or answer any questions you may have and offer the services of my colleagues and staff to the Subcommittee's efforts.

Asamoah, Harvetta

From: Carol Balassa [CBALASSA@ustr.gov]
Sent: Wednesday, February 20, 2002 1:21 PM
To: ddownes@att.net; Mcleod.Barbara@epa.gov; Harvetta.Asamoah@hq.doe.gov;
Lana.Ekimoff@hq.doe.gov; David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov;
EnisME@state.gov; Richard.Larm@usdoj; Richard.Larm@usdoj.gov; CMelly@usitc.gov;
JBaumert@usitc.gov; Steve Fabry; R Federal Record
Subject: Followup to today's meeting



WordPerfect 6.1

Did I forget anything?

Carol

Asamoah, Harvetta

From: Richard Larm [Richard.Larm@usdoj.gov]
Sent: Friday, February 01, 2002 11:13 AM
To: CBALASSA@ustr.gov; David_Downes@ios.doi.gov; ddownes@att.net; EnisME@state.gov;
FABRY.STEVE@ustr.gov; Harvetta.Asamoah@hq.doe.gov; jbaumert@usitc.gov;
Lana.Ekimoff@hq.doe.gov; Mcleod.Barbara@epa.gov; melly@usitc.gov; r@ustr.gov;
Richard.Larm@usdoj.usitc.gov; Richard_Boll@ita.doc.gov
Subject: RE: Revised Duke Energy Int'l Services Listing -Reply

Chris:

[Redacted]

(b)(5)

>>> Christopher Melly 02/01/02 10:52am >>>

[Redacted]

(b)(5)

(b)(5)

Chris

----- Original Text -----

From: "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov>, on 1/31/02 5:06 PM:
To: iSMTP@MASTER7@ADP7["Carol Balassa"
<CBALASSA@ustr.gov>], iSMTP@MASTER7@ADP7[<downdes@att.net>], iSMTP@MASTER7@ADP7
[<
Mcleod.Barbara@epa.gov>], iSMTP@MASTER7@ADP7["Asamoah, Harvetta"
<Harvetta.Asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7["Ekimoff, Lana"
<Lana.Ekimoff@hq.doe.gov>], iSMTP@MASTER7@ADP7[<David_Downes@ios.doi.gov>], iSMTP
@MASTER7@ADP7[<Richard_Boll@ita.doc.gov>], iSMTP@MASTER7@ADP7[<EnisME@state.gov>
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oj.gov>], iSMTP@MASTER7@ADP7["Steve Fabry"
<FABRY#032#STEVE@ustr.gov>], iSMTP@MASTER7@ADP7["R Federal Record"
<r@ustr.gov>], Christopher Melly@SI@ID, Jennifer Baumert@SI@ID

(b)(5)

(b)(5)

(b)(5)

... Duke concerned that an incumbent

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]

Sent: Thursday, January 31, 2002 3:04 PM

To: ddownes@att.net; Mcleod.Barbara@epa.gov;

Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov;

David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov; EnisME@state.gov;

Richard.Larm@usdoj; Richard.Larm@usdoj.gov; CMelly@usitc.gov;

JBaumert@usitc.gov; Steve Fabry; R Federal Record

Subject: Revised Duke Energy Services Listing

is attached for your review and comment.

is attached for your review and comment.

(b)(5)

Asamoah, Harvetta

From: melly@usitc.gov
Sent: Friday, February 01, 2002 8:36 AM
To: 'Carol Balassa'; Asamoah, Harvetta; Ekimoff, Lana; R Federal Record; Steve Fabry;
David_Downes@ios.doi.gov; ddownes@att.net; EnisME@state.gov;
Harvetta.Asamoah@hq.doe.gov; Mcleod.Barbara@epa.gov; Richard.Larm@usdoj.gov;
Richard.Larm@usdoj.usitc.gov; Richard_Boll@ita.doc.gov; jbaumert@usitc.gov
Subject: RE: Revised Duke Energy Int'l Services Listing

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(b)(5)

(b)(5)

(b)(5)

Chris

----- Original Text -----

From: "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov>, on 1/31/02 5:06 PM:
To: iSMTP@MASTER7@ADP7["Carol Balassa"
<CBALASSA@ustr.gov>], iSMTP@MASTER7@ADP7[<ddownes@att.net>], iSMTP@MASTER7@ADP7
[<
Mcleod.Barbara@epa.gov>], iSMTP@MASTER7@ADP7["Asamoah, Harvetta"
<Harvetta.Asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7["Ekimoff, Lana"
<Lana.Ekimoff@hq.doe.gov>], iSMTP@MASTER7@ADP7[<David_Downes@ios.doi.gov>], iSMTP
@MASTER7@ADP7[<Richard_Boll@ita.doc.gov>], iSMTP@MASTER7@ADP7[<EnisME@state.gov>
], iSMTP@MASTER7@ADP7[<Richard.Larm@usdoj>], iSMTP@MASTER7@ADP7[<Richard.Larm@usd
oj.gov>], iSMTP@MASTER7@ADP7["Steve Fabry"
<FABRY#032#STEVE@ustr.gov>], iSMTP@MASTER7@ADP7["R Federal Record"
<r@ustr.gov>], Christopher Melly@SI@ID, Jennifer Baumert@SI@ID

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From: Carol Balassa [mailto:CBALASSA@ustr.gov]

Sent: Thursday, January 31, 2002 3:04 PM

To: ddownes@att.net; Mcleod.Barbara@epa.gov;
Harvetta.Asamoah@hq.doe.gov; Lana.Ekimoff@hq.doe.gov;
David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov; EnisME@state.gov;
Richard.Larm@usdoj; Richard.Larm@usdoj.gov; CMelly@usitc.gov;
JBaumert@usitc.gov; Steve Fabry; R Federal Record
Subject: Revised Duke Energy Services Listing

is attached for your review and comment.
is attached for your review and comment.

Would appreciate comments by noon tomorrow so I can ship this out before the weekend. Thanks. Carol

Asamoah, Harvetta

From: Ekimoff, Lana
Sent: Thursday, January 31, 2002 5:15 PM
To: Carol Balassa [] (E-mail); Chris Melly (E-mail); Richard Boll (E-mail); Asamoah, Harvetta
Subject: enron

Attached for your information is testimony by Cera on the impact of Enron on power



tenroncera.wpd

markets.

Lawrence Makovich's Testimony to the U.S. Senate Committee on
Energy and Natural Resources
January 29, 2002 / News Article

During his testimony, Dr. Makovich provides an overview of the global crisis of confidence in the deregulation of power markets and the impacts of Enron's collapse on these markets, with a specific emphasis on the spot energy markets, ancillary service markets, energy future markets, forward power markets, capacity markets and retail power markets. According to Dr. Makovich, the impacts of Enron's collapse on these evolving power markets ranges from negligible to significant.

Testimony to the United States Senate: Implications of the Enron Collapse for
Energy Markets
January 29, 2002

Washington, DC

The collapse of Enron, America's largest electricity trader, on the heels of the California power shortage creates a crisis of confidence in the deregulation of power markets. The regional power markets across the United States are a set of interconnected markets: spot energy markets, ancillary service markets, energy futures markets, forward power markets, capacity markets, and retail power markets. The impacts of Enron's collapse on these evolving power markets ranges from negligible to significant. Few impacts are found in the spot, ancillary service, futures, and capacity markets. Significant impacts are found in forward power markets in the short run and retail markets in the long run.

Electric Energy Hot Spots

Enron's collapse had little impact on spot energy markets—the trading of megawatt-hours in real time. An examination of daily spot market prices over the past year shows no discernible impacts

on electric energy prices on critical dates surrounding the Enron collapse—including around December 2, when Enron declared bankruptcy. Therefore, Enron's collapse did not distort the price signals that determine the efficient utilization of power plants in regional markets across the country.

Power Ancillary Service Markets

Enron's collapse did not significantly affect ancillary service markets that involve transactions for commodities including voltage support, reactive power, and spinning reserves. These markets are necessary because buyers and sellers of power cannot simply contract for power flows without confronting the thermal, voltage, and stability constraints of moving power through a network of high-voltage lines. Physics dictates that power flow along the path of least resistance and not along the contract paths dictated by market transactions. As a result, simple bid-and-offer negotiations can neither determine supply nor clear fast enough to balance electric supply and demand reliably in real time. Thus, power markets involve rules and institutions to create markets or contract terms to provide these commodities. Enron's collapse did not close down critical energy supply infrastructure and therefore did not threaten electric reliability or increase the likelihood of brownouts or blackouts.

Power Futures Markets

The power business is a risky energy transformation business. Thus, futures and forward power markets are necessary to provide risk management. For example, energy futures markets involve trading of standardized power contracts for energy delivery at future dates. Such a futures contract allows a buyer to purchase electric energy at a fixed price ahead of the delivery date. As such it provides a hedge against high spot energy prices in the future. The counter-party to this purchase

is typically a power supplier who runs the opposite risk: low spot energy prices. Power suppliers typically commit to multimonth contracts for fuel supply and consequently face the risk that future power prices may be too low to cover locked-in fuel costs and quantities. Thus, a futures transaction brings together parties with opposite risk exposures to mitigate their risk. The futures exchanges are set up around liquid spot trading hubs because although few futures contracts involve physical delivery, such physical delivery has to be possible in order for the hedging activity to take place. A settlement of the futures contract occurs based upon the difference between the futures contract price and the actual spot price of electricity on the due date.

The most significant impact derives from Enron's position as America's largest power trader. Enron's bankruptcy forced many power contracts to unravel—at a significant cost to Enron's counter-parties. Similar nonperformance problems surfaced during the 1998 defaults by bankrupt traders and brokers in the Midwest power markets and during the California power crisis, requiring counter-parties to write off hundreds of millions of dollars. Such write-offs are necessary again in the wake of Enron's collapse. Consequently, many Enron counter-parties may suffer value declines in capital markets, at least for some period of time.

However, there is an important caveat: Although Enron's collapse forced market players to scramble to replace contracts and mitigate risk exposures, the collapse occurred with enough warning to avoid a shock to energy futures prices. Some of this stability is due to the futures exchanges themselves. These exchanges are run by neutral third-party entities such as the New York Mercantile Exchange (NYMEX) that were in a position to intervene for Enron's noperformance and maintain market liquidity.

Power Forward Markets

Enron's collapse affected forward power markets. Forward power markets involve

nonstandardized

the monthly bilateral contracts for power delivery in the future and are usually longer term than

contracts of futures market contract. Such contracts are necessary because the standardized

power futures markets are appropriate to manage some but not all of the risk in the

business. However, unlike futures markets, no neutral third-party entity organizes these markets.

As a result, Enron filled this void in the power market by being a market maker in forward power markets.

As a market maker, Enron set up a many-to-one trading platform—EnronOnline—to facilitate

continuous transactions. To make it attractive, Enron provided market liquidity by insuring

operated as a transactions as an intermediary. This was one of the major reasons why Enron

collapse put buyer or seller in roughly one quarter of all electric trading activity. Enron's rapid

as Enron pressure on forward market players to scramble and adjust their contract positions

void left by collapsed. As a result, other power traders were able to expand activity and fill the Enron's collapse.

Other traders have filled in for Enron in forward markets. Enron's collapse suggests that it was a

oversight. As a mistake to allow a significant market buyer or seller to be a market maker without

from Enron and market maker, Enron created information asymmetry by requiring all buyers to buy

providing more all sellers to sell to Enron. Consequently, even though Enron aided the market by

the first to know price information and liquidity, it was also in a position to be consistently among

software in about most forward power markets transactions. As a result, this critical enabling

interactions between forward power markets did not maximize market transparency concerning

an information buyers and sellers, but instead EnronOnline may have allowed the company to gain

goes on; advantage. Of course, this remains to be examined as the investigation into Enron

however, such information asymmetries can create a serious market flaw.

In the extreme, information asymmetry becomes insider trading, and such a flaw has the potential to destroy confidence in a market. However, even well short of that situation, lesser information asymmetries can also create potential problems. To see this, imagine the temptations facing a market maker/player to take large speculative positions in forward power markets believing that its information advantage will allow reversal of the position ahead of others if the market moves against it. Such information asymmetry puts other market players at a disadvantage and even puts investors in a position of being the last to know about the speculative positions of the trading companies they own. An information-advantaged market maker/player has the potential to create a destabilizing trader collapse if the information advantage is not perfect and eventually results in a big, wrong, inescapable bet.

Allowing the largest buyer and seller in a market to be a market maker without oversight is also a mistake because such conditions create dangerous incentives when a market maker/player also tries to function as an objective arbiter of forward power prices. This potential problem arises when the market maker/player uses mark-to-market accounting for its forward power positions and as a result, is not indifferent to forward power prices.

To see the flaw in allowing a major player to also be the market maker without oversight, suppose a market maker/player buys power under a ten-year contract from a supplier. The market maker uses this transaction, along with other similar transactions on which it acts as an intermediary, to establish the forward power price curve at that time. This requires the application of some judgment, because these transactions are not standardized. As time passes, other transactions occur that provide the basis for the market maker to reset the forward price curve. If the forward price curve increases, then the value to the power buyer of the ten-year power sales contract at the fixed price increases. On the other hand, if the forward price curve decreases, then the value to

the power buyer of the ten-year power purchase contract declines.

Mark-to-market accounting allows the buyer to record this change in contract value as current period earnings. Clearly, a dangerous incentive arises because the market maker/player that has either a net long (purchases exceed sales) or net short (sales exceed purchases) position has the incentive to shade reported forward prices to increase its own reported earnings. Therefore, oversight is essential when a major market player is clearly not indifferent to the forward price and yet fills the role of objective arbiter of forward power prices.

Power Capacity Markets

Enron's collapse may have a positive impact on capacity markets. Capacity markets involve the trading of dispatchable megawatts to insure the long-run supply-and-demand balance in power markets. Enron was an influential stakeholder involved in power market design and an opponent of capacity markets. Enron believed that forward market contracts would keep supply and demand in balance in power markets over the long run. As a result, Enron's demise may help build a consensus that forward markets cannot fulfill this function and capacity markets are needed. Such capacity markets are a common element in the power markets that evolved from tight power pools. The reforms in the California market design include a plan to create capacity markets.

Retail Power Markets

Enron's collapse contributes to a crisis in confidence in power market deregulation that significantly affects state legislation and implementation of retail energy market reform. The problem is that retail markets are linked to wholesale markets and power markets cover large, multistate regions. Thus, seven years into power industry deregulation, less than half of the electricity customers in the United States have choice of power suppliers and only

a small fraction

deregulation of demand is linked to market price signals. This loss of momentum in power perpetuates a volatile mix of uncoordinated markets and regulation into the future.

The well-publicized collapse of Enron is slowing or reversing power industry restructuring's move away from regulation and toward the market in by overshadowing the positive evidence and lessons from evolving power markets that are working in several US regional markets.

Conclusion

Enron's collapse had significant impacts on some power markets but does not threaten the US power system in the near term. Enron's collapse on the heels of the California power crisis does create a crisis of confidence that may affect the course of industry restructuring in the long run. Of course, it will take a year or more to find out if the problems of a lack of oversight, distorted market player/maker incentives, or asymmetry of information played a role in Enron's demise—or whether the collapse was primarily driven by quite different factors, connected to partnerships and debt. Nevertheless, such a daunting investigative task simply highlights the need for greater oversight in forward power markets as part of the developing structure of power markets.

Related Links

To hear the whole session of yesterday's testimony before the United States Senate Committee on Energy and Natural Resources on the "Implications for Energy Markets of the Enron Collapse", please visit the C-SPAN website.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, December 13, 2001 9:23 AM
To: Ekimoff, Lana; 'melly@usitc.gov%internet'; 'cballassa@ustr.gov%internet';
'Richard_Boll@ita.doc.gov'
Subject: Enron looms over House electricity deregulation

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-UPDATE 1-Enron looms over House electricity deregulation

Reuters (December 12, 2001)

WASHINGTON, Dec 12 (Reuters) - U.S. Democrats on Wednesday pointed to energy giant Enron Corp's disintegration as a good reason to delay any federal attempt to deregulate the nation's \$220 billion electricity industry.

The Houston company's abrupt slide into bankruptcy loomed over a House Energy and Commerce subcommittee hearing on proposals to deregulate the nation's power supply.

Some Democrats on the panel said Enron was the prime mover behind a Republican-written deregulation bill.

"Enron's fingerprints are all over the legislation we are examining today," said Henry Waxman, a California Democrat. "This bill essentially federalizes the nation's electricity grid, just as Enron has advocated for years."

The draft bill offered by Rep. Joe Barton, the Texas Republican who heads a House Energy subcommittee, would open the wholesale power grid to greater competition.

Enron, a longtime proponent of deregulation, transformed itself from a small pipeline company into the nation's biggest trader of electricity and natural gas. The firm's downfall has been linked to its accounting practices and large debts.

Edward Markey, a Massachusetts Democrat, said any deregulation bill should wait until it is clear what the energy market impact will be from Enron.

"In the aftermath of the Enron collapse, I think that we need to look very seriously at extending some greater oversight into the trading of electricity," Markey said.

ENRON CEO THROWN OUT

While Enron cultivated many friends on Capitol Hill with its campaign contributions, the company's brash approach to deregulation also raised some eyebrows.

Barton described how Enron's former chief executive officer tried to pressure him when writing energy legislation.

"The only CEO I've ever thrown out of my office was the CEO of Enron, Mr. Jeff Skilling, because he came into my office last year and basically told me what was going to be in the bill or else," Barton said. "And I said, 'or else,' and he was asked to leave."

The Republican head of the Federal Energy Regulatory Commission said Enron's collapse had little effect on the electricity market and should not slow federal deregulation.

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"The big story is that markets didn't hardly hiccup at all. I think energy markets performed admirably well," FERC chairman Pat Wood told the subcommittee.

William Massey, a Democratic FERC commissioner, said he was concerned by Enron's failure because it "was the most visible corporate symbol of energy deregulation in the world."

"The collapse was not related to a failure of the energy markets," Massey said. "Perhaps the accounting standards and requirements for public utilities should be strengthened. Perhaps we should take a look at disclosure requirements for all public utilities."

FERC PUSHES FOR DEREGULATION BILL

Wood urged Congress to pass electricity restructuring bill to encourage the industry to build more plants and shield consumers from high prices.

For several years Congress has failed to adopt any electricity legislation, while more than half the states in the country have pushed ahead with their own plans.

"The uncertainty of the lengthy transition is harming infrastructure investment and reliability, and raising Americans' electricity bills unnecessarily. It is time to finish the job," Wood said.

Wood asked Congress to give FERC greater authority to create so-called regional transmission organizations (RTOs). RTOs put public utility transmission lines in a region under common control to provide open access and more competition.

FERC has an ambitious plan to create a handful of RTOs to manage the grids in the U.S. Northeast, South, Midwest and West. Some U.S. utilities have balked at giving up control of their transmission facilities, and state regulators have complained that FERC has failed to include them in planning.

RTOs could also play a role in the politically sensitive issue of eminent domain authority, Wood said.

Barton's bill would give states 12 months to settle transmission siting issues, then give FERC the authority to make a decision if no state action is taken. Wood said he preferred that each RTO instead of FERC have default eminent domain authority.

The panel also heard from Francis Blake, deputy secretary of the Energy Department, who said his staff was preparing an analysis of U.S. electricity transmission bottlenecks.

The study, ordered last summer by President George W. Bush as part of his national energy plan, was due to be released by Dec. 31. The White House also asked the DOE to prepare deregulation legislation to promote competition.

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From: Asamoah, Harvetta
Sent: Friday, November 30, 2001 10:36 AM
To: 'cbalassa@ustr.gov'
Cc: Ekimoff, Lana; 'EnisME@state.gov%internet'; 'MellyC@usitc.gov%internet'; 'Richard.Larm@usdoj.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'jbaumert@usitc.gov%internet'; 'WheelerE@state.gov'
Subject: Enron collapse will not affect Texas retail power market liberalisation

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FOCUS Enron collapse will not affect Texas retail power market liberalisation

AFX News Limited (November 29, 2001)

WASHINGTON (AFX) - The countdown to deregulating Texas' electricity retail market by Jan 1 will not be affected by the financial collapse of Houston-based Enron Corp, which is one of the state's largest energy trading companies, according to the Public Utility Commission of Texas.

Some analysts have questioned whether a voluntary bankruptcy filing by Enron, which is also one of the nation's largest electricity and natural gas trading concerns, could cause trading volatility and liquidity crunches in the energy and credit markets.

However, both federal and state regulators stress that they are seeing no evidence of this yet, and that Enron's financial woes would not be dramatic enough to damage Texas' timetable for liberalising its power markets.

"At this time now we don't see much change. There are two Enron subsidiaries that are certified as retail electric providers, under competition, however there are more than 35 certified retailers and these particular two Enron subsidiaries are only targeting a small number of commercial customers," said Terry Hadley, a spokesman for the Public Utility Commission of Texas in Houston.

Enron does not sell any electricity to retail customers in the state.

Asked if retail market liberalisation could be affected by Enron's troubles, Hadley replied: "Our target remains January 1st."

State legislators are moving to open up Texas' retail power market following the successful deregulation of the state's wholesale power market in September of 1995.

Under retail liberalisation, some 5.3 mln household consumers across the state will be able to select which investor-owned utility provides them with their electricity supplies.

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Some 1.0 mln consumers in the state will not benefit from retail liberalisation because they currently purchase their power supplies from municipal or electric cooperative power companies.

State power transmission and distribution will remain under the regulatory watch of the state, and is not expected to be liberalised in the near future.

Hadley said that Enron's commercial customers in the state should not have any problems sourcing new electricity supplies from competing companies like Duke Energy, American Electric Power Co, Exelon Energy Company, Calpine Corp or Texas Utilities Co (TXU) who all operate in the state.

Several of these energy companies have ceased trading with Enron, one company stopped trading with Enron a month ago, but they are not noticing any aberrations in the market, and are confident they will be able to underwrite any supply interruptions that may arise, according to company sources who asked to remain anonymous.

Despite this, the Public Utility Commission of Texas is continuing to keep a close eye on the power market.

Duke Energy, AEP, Exelon, Calpine, and TXU "all seem to be confident and comfortable that their operations will continue and we have not noticed any (power market) aberrations this week," Hadley said.

Company representatives also said that the market appears to be operating in a normal fashion, and that they are continuing their efforts to ramp up for deregulation in January.

Dallas-based TXU, the largest investor-owned utility in Texas, has increased its Houston trading team headcount to 400 from 40 staff a year ago in preparation for liberalisation of the retail market which is expected to boost its earnings.

About 30 pct of TXU's earnings currently come from its non-regulated businesses outside the US, but by 2002, 70 pct of the group's earnings will come from competitive businesses in the US, the UK and Australia, according to TXU spokeswoman Carol Peters.

Peters said that TXU is "comfortable" with its exposure to Enron, and that it and other major energy traders in the state are coming together to underwrite supplies and keep the market liquid.

A spokeswoman at the Federal Regulatory Energy Commission in Washington also said that the state's and nation's energy markets appeared to be stable today as Enron's fortunes continued their downward spiral, but some lawmakers are starting to question the industry's regulatory framework.

Enron's shares continued their sharp decline in trading today as the prospect of a bankruptcy filing appears to be the only way it can move to restructure itself following the downgrading of its debt to junk status yesterday, and its ejection from the Standard & Poors 500 index today.

Asked if the stock collapse of Enron could cast a shadow over liberalisation, and whether market regulation needs closer scrutiny, Senate Majority Leader Thomas Daschle said: "We're certainly going to try to find answers to the questions involving the collapse of Enron."

"I don't know that anybody knows yet just how this happened and how it happened so quickly. I think we need to find as much information as is possible and make some assessment about whether its indicative of energy in the larger context, and if it is, what we ought to do about it," Daschle told reporters at a Congressional briefing.

"Clearly, it raises some very serious questions," he added.

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Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Tuesday, December 04, 2001 9:47 AM
To: 'cbalassa@ustr.gov'
Cc: Ekimoff, Lana; 'EnisME@state.gov%internet'; 'melly@usitc.gov'; 'Richard.Larm@usdoj.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'jbaumert@usitc.gov%internet'; 'WheelerE@state.gov'
Subject: Enron demise will not stall EU power trade-Palacio

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-Enron demise will not stall EU power trade-Palacio

Reuters (December 03, 2001)

BRUSSELS, Dec 3 (Reuters) - The collapse of U.S. energy trading giant Enron will not hold up the pace of power market liberalisation in the European Union, the bloc's top energy official said on Monday.

"We don't expect a big impact on the general energy markets in Europe," EU Energy Commissioner Loyola de Palacio told Reuters.

Enron, which filed for bankruptcy protection on Sunday, was at the forefront of companies trading in the EU's increasingly open electricity and gas markets and it supported de Palacio's bid for complete market opening by 2005.

De Palacio, whose proposals have met with some reluctance from certain EU member states, particularly France, said Enron's collapse had not shaken her belief in the need for more liberalisation and trading.

"I am going to go straight on with liberalising the electricity and gas markets," she said.

"What we are not prepared to do is accept that some take the opportunity to say that this is because of liberalising the market.

"This (the Enron collapse) has nothing to do with market liberalisation. That's very clear.

"There is a healthy, liberalised market. The Enron question is not because of trading activities in Europe. The question of Enron is related to other kinds of activities in other parts of the world."

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UNITED STATES OF AMERICA
BEFORE THE
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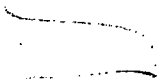
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Respectfully submitted,

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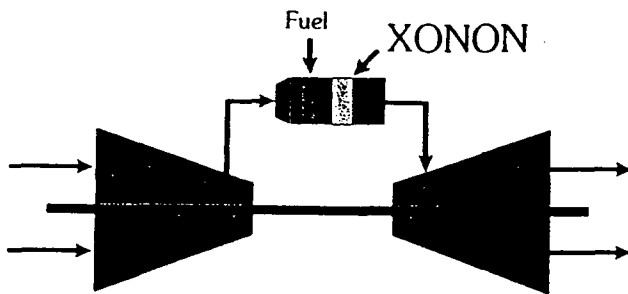
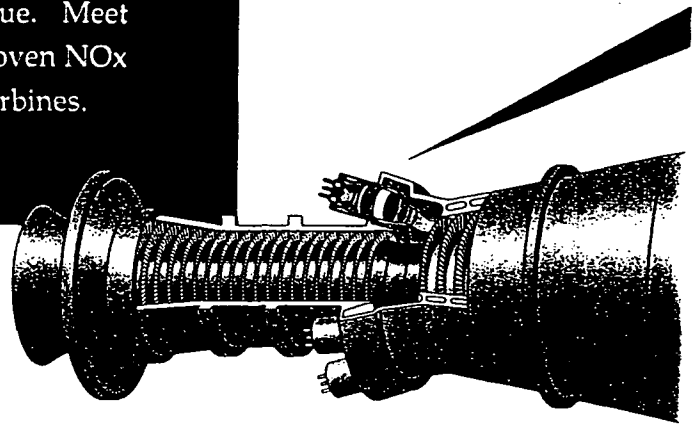


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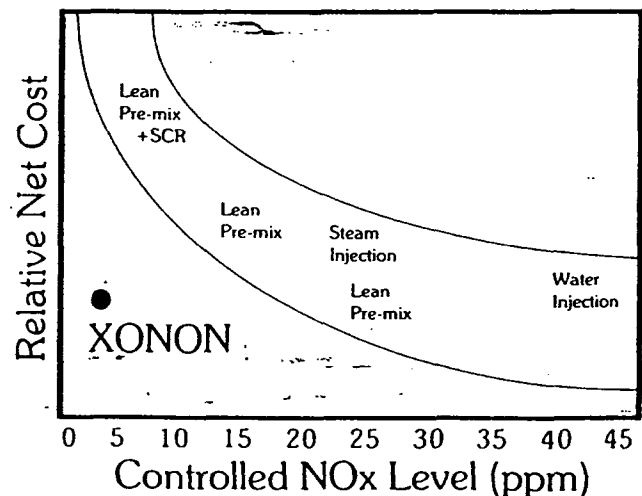
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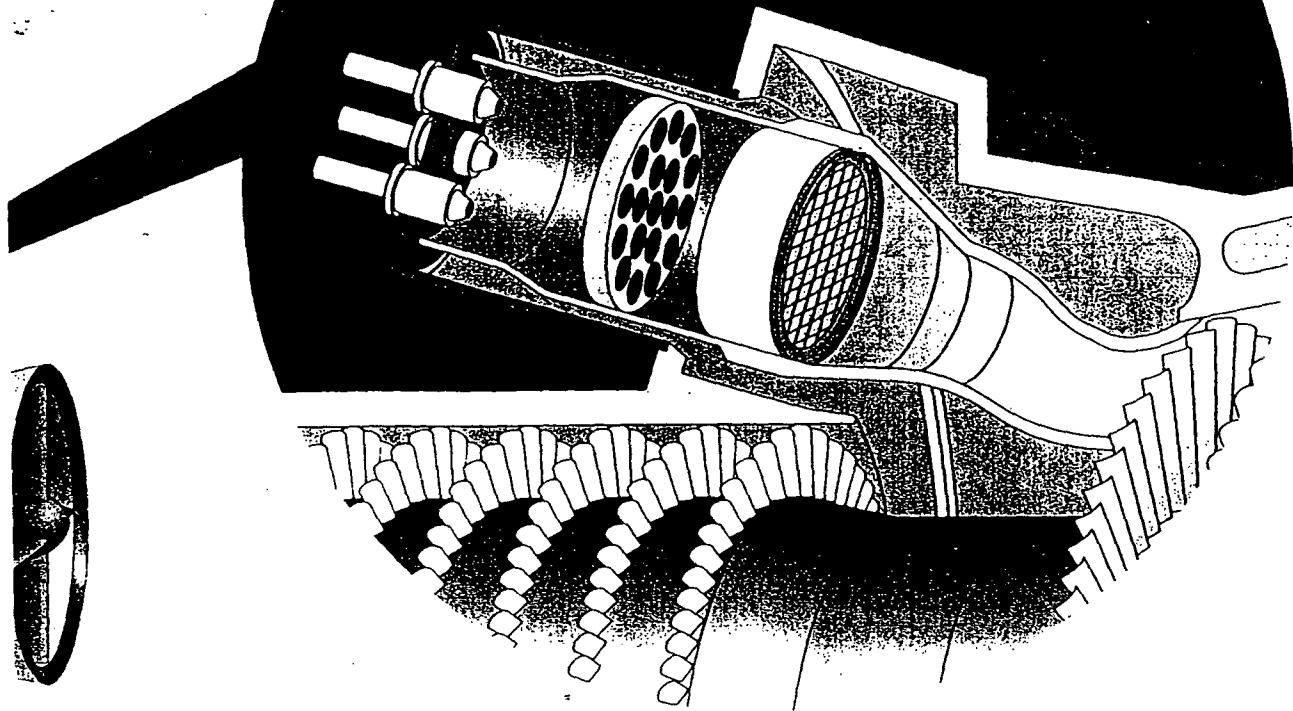
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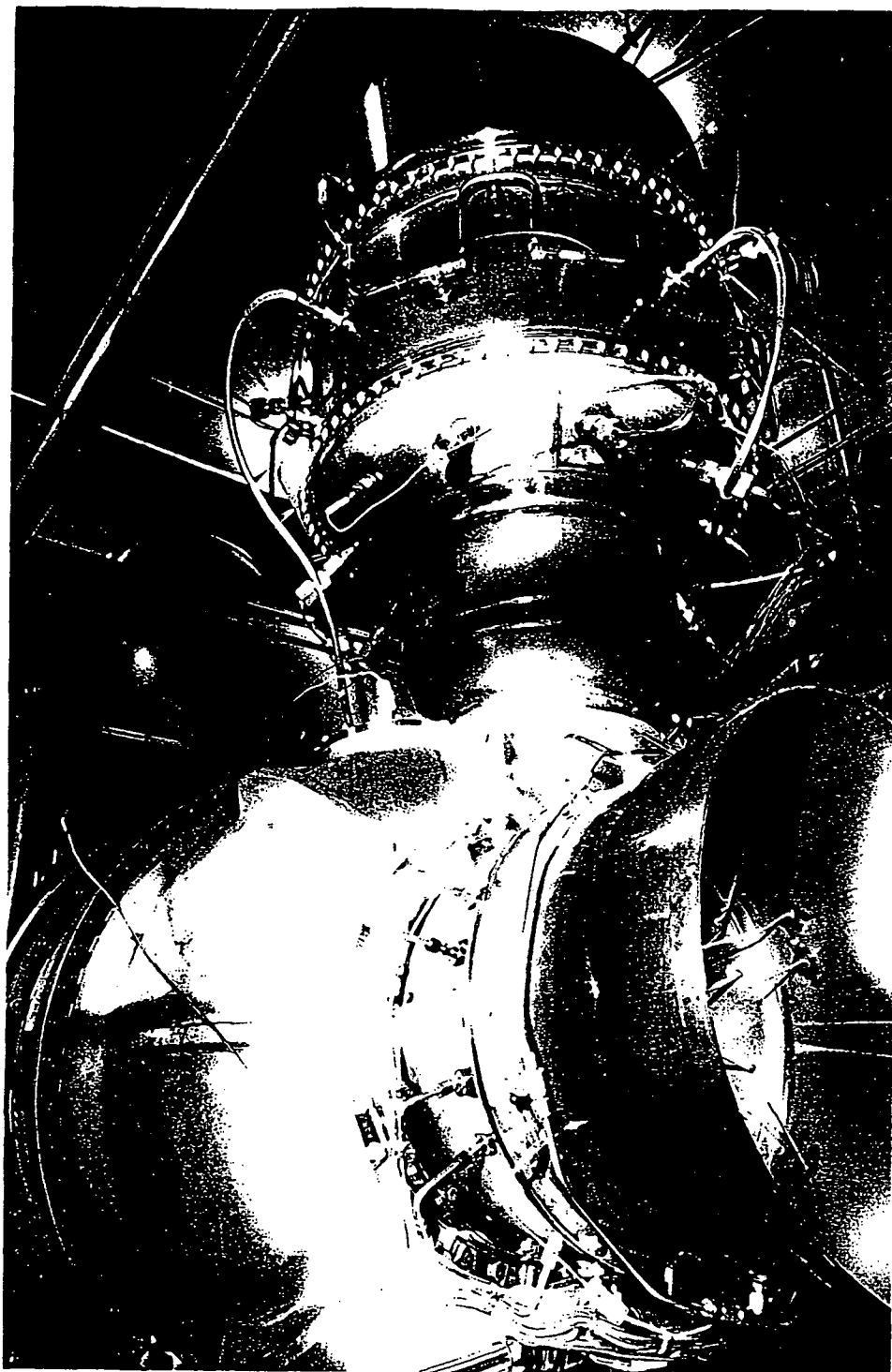
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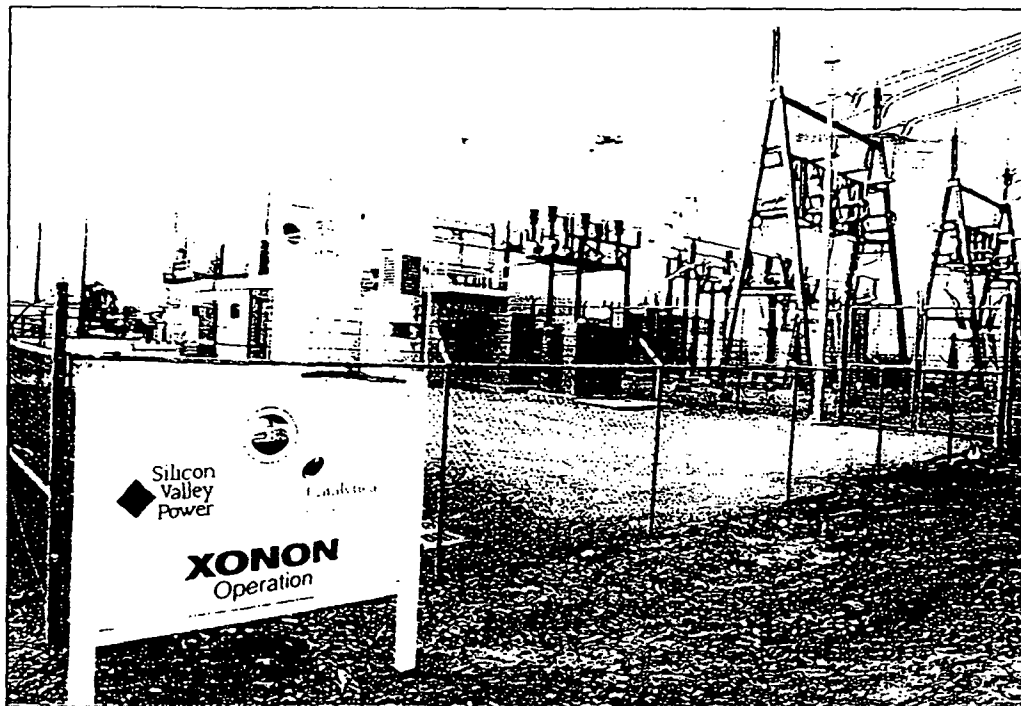


It's working at 3ppm -

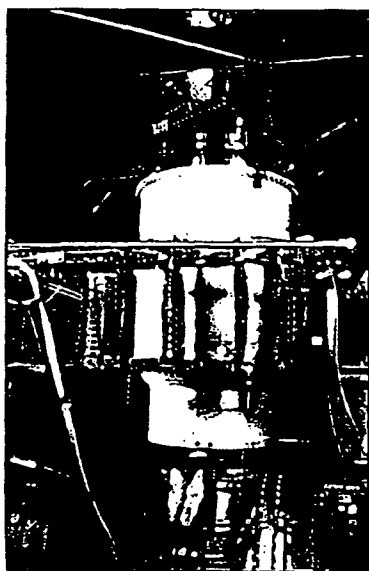
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The XONON-2 beta version of commercial combustor installed at Silicon Valley Power.



The XONON family of catalyst modules for Kawasaki, GE, Rolls Royce, and Pratt & Whitney gas turbines.

Tests of catalytic-combustion technology show low emissions

L. Charles Solt, James C. Schlatter / Catalytica Combustion Systems Inc., Mountain View, Calif.

Turbine-inlet temperatures of 1,900-2,000 °F are required to produce energy, depending upon the turbine design. Combustion of fuels, however, occurs at temperatures greater than 2,800 °F.

At these temperatures, nitrogen and oxygen combine to produce nitrous oxide (NO_x), a U.S. Environmental Protection Agency criteria pollutant that contributes to the formation of ozone.

Impact on natural-gas pipeline operations

Because gas turbines are used to drive compressors, NO_x regulations will also affect pipeline operators. Specifically, there are two federal programs under development that will significantly impact both existing and new gas turbine pipeline compression stations.

- Ozone Transport Assessment Group (OTAG) has recommended regulatory changes to prevent attainment areas from negatively impacting downwind non-attainment areas.

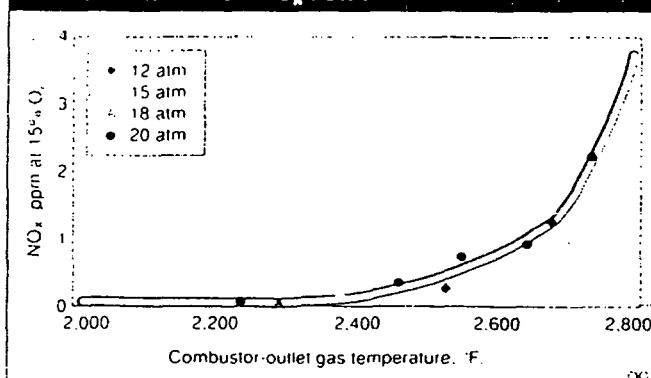
- National Ambient Air Quality Standards revisions signed by President Clinton last June will tighten the standards for ozone and particulate matter.

Pipeline companies would, therefore, be well advised to consider technologies now that will mitigate the impact of these impending regulations.

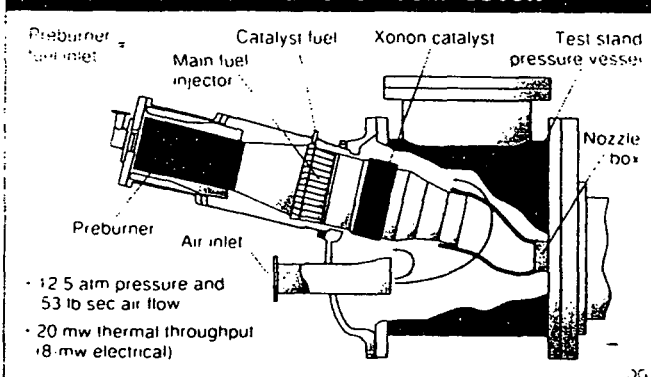
A flameless, catalytic combustion process, Xonon, developed by Catalytica Combustion Systems Inc. (CCSI), Mountain View, Calif., combusts fuels at less than 2,400 °F.

Two full-scale tests and another on an actual turbine in the field have indicated that

XONON IMPACT ON NO_x FORMATION



GE 7/8 EA FULL-SCALE XONON COMBUSTOR



Xonon consistently achieves NO_x emissions of <3 ppm while maintaining optimum operating conditions in the turbine.

In November 1996, CCSI received its first commercial contract for Xonon when the City of Glendale, Calif., agreed to retrofit a Pratt & Whitney FT-4 turbine with Xonon at its Grayson power plant. The system will be delivered in early 1999.

GE announced its intent in June 1997 to market the Xonon system to its installed base of gas turbines worldwide. In December 1997, Enron Ventures Corp. announced it will invest \$30 million to help ac-

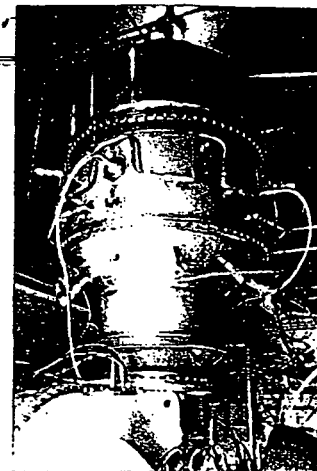
celerate Xonon's commercialization.

NO_x control technologies

The amount of NO_x produced in a combustion process depends on the maximum temperature attained at any point in the combustor and on the total time at this temperature (Fig. 1).

A typical gas-turbine combustor would have a gas residence time in the range of 10-100 ms, depending upon the combustor design. To minimize NO_x formation, it is necessary to reduce the average temperature of the combustor and to eliminate hot spots.

Hot spots are small regions



Full-scale testing of the Xonon emissions-reducing combustion technology continues on a Kawasaki M1A-43A engine in Tulsa. The engine has achieved more than 1,100 operating hr and 220 cycles of start-up/shut-down (Fig. 3).

where a high fuel/air ratio results in high local temperatures. Eliminating them eliminates the major cause of high NO_x levels, as shown by the rapid rise in NO_x level as the temperature increases.

During the last 20 years, scientists have been working to develop technologies that reduce NO_x emissions while maintaining optimum temperatures and turbine performance. Standard diffusion-flame combustors produce NO_x in a range of 100-200 ppm, levels prohibited under current U.S. federal and state regulations.

Dry controls, in which more air is used in the primary combustion zone than is necessary to burn all the fuel, were initially used to lower the peak temperature and reduce NO_x formation. But these reduced NO_x by only 10-20%.

Wet controls, in which water or steam is injected into

the primary combustion zone with the fuel, were introduced to reduce peak flame temperature and NO_x formation. Water and steam increase power output but increase maintenance costs.

And the greatly increased fuel consumption and steam required for steam injection usually result in a net fuel-rate increase and also produce carbon dioxide (CO_2) and unburned hydrocarbons (UHC) of >50 ppm.

Lean premix, in which fuel and air are premixed before they enter the combustor, was then introduced. With this approach, most gas-turbine manufacturers today guarantee NO_x levels of 15-25 ppm; a few have guaranteed lower levels.

Most are experiencing problems with combustion noise, vibration, and deterioration. Lean premix can also substantially increase CO and UHC.

Selective catalytic reduction (SCR) is also commonly used today to reduce NO_x , typically by 80%. In SCR, NO_x reacts with an injected reducing agent, usually ammonia. SCRs are relatively expensive and use toxic metals which deteriorate with use and must be treated as a toxic waste upon disposal.

Catalytic combustion

A major challenge has been the difficulty in ignition over a wide range of mixture (air and fuel) inlet temperatures corresponding to the compressor discharge temperature at various engine loads. Also, no one had developed catalyst substrate materials capable of withstanding surface temperatures close to adiabatic combustion temperatures for long periods of operation.

The Xonon combustion system carries out combustion so that formation of NO_x is prevented while low CO and UHC levels are achieved. The system is contained within the combustor of the gas turbine which consists of four sections (Fig. 2):

- The preburner for start-up and acceleration of the engine and for adjusting catalyst inlet temperature, if required

- The fuel injection and fuel-air mixing system. This unit injects the fuel and mixes it with the main air flow to provide a uniform fuel-air mixture to the catalyst.

- The Xonon catalyst module in which a portion of the fuel is combusted without a flame to produce a high-temperature gas

- The homogenous combustion region or burnout zone, immediately downstream of the catalyst module, in which the remainder of the fuel is combusted and CO and UHC are reduced to low levels. This process also is flameless.

The overall combustion process involves a staged system in which a por-

tion of the fuel is consumed within the catalyst, but the final combustion that generates the highest temperatures takes place in a volume downstream from the catalyst.

Partial combustion within the catalyst produces no NO_x . Between the preburner and the homogenous combustion downstream of the catalyst, the system produces only 1-3 ppm NO_x because the combustion occurs at a uniformly low temperature.

The system is contained in the combustor and is not a process for clean-up of the exhaust that leaves the gas turbine. Instead, it prevents NO_x from forming.

The catalyst module incorporates a chemical thermostat that acts to limit the catalyst temperature even at very high fuel/air ratios, so that the catalyst temperature is significantly below the combustor outlet temperature, allowing the use of a metal substrate.

Xonon enables the combustor to produce the high outlet-gas temperatures required for modern gas turbines. But the catalyst operates at a relatively low temperature that minimizes the stress on the catalyst and achieves good durability for the overall combustor system.

In lean premix combustors, fuel and air are premixed to minimize the peak combustion temperature. The fuel-air mixture has a much higher combustion temperature in the lean premix combustor, however, because a conventional flame must be generated and sustained at the high gas velocities present in the lean premix combustor.

The higher combustion temperature results in the higher levels of NO_x . If more air is mixed into the fuel in a lean premix system to reduce the NO_x level further, the flame becomes unstable and combustor noise and vibration result.

In the Xonon system, the fuel-air mixture is so diluted that it would not burn in a conventional flame. In addition, the Xonon catalyst is designed to combust only a portion of the fuel, providing control of the gas-outlet temperature from the catalyst module.

The Xonon system is applicable over a wide range of combustor outlet temperatures, including advanced turbine designs. Tests have shown that even at combustor outlet gas temperatures of 2,700° F. (1,500° C.), envisioned for the next generation of turbines, the NO_x level was only 2 ppm.

Full-scale tests

Development of the Xonon combustion system began with laboratory tests on small-scale catalysts at atmospheric pressure. Since then, the combustors as large as 8 mw have been operated successfully in manufacturing tests facili-

ties.¹²

Most recently, Xonon technology has been demonstrated on an operating turbine—a 1.5 mw Kawasaki M1A-13A machine.

Three successful tests conducted on Xonon have addressed the primary challenges historically faced by catalytic combustion and the emissions and operational challenges associated with other combustion systems.

General Electric

Testing was completed in June 1996 in a catalytic combustor system test stand developed by GE for its MS9001E gas turbine, in cooperation with CCSI and Tokyo Electric Power Co. The MS9001E combustor operated with a full-load firing temperature of 2,021° F. (1,105° C.) and a combustor exit temperature of about 2,174° F. (1,190° C.).

Experimental data were obtained over a range of test conditions from full speed no-load to base-load simulation. The continuously recorded data included flow rates, inlet and exit temperatures and pressures, dynamic pressures, and emissions.

Emissions targets were met both at simulated base load and part load (78%) test points. These were: base-load—3.3 ppm NO_x , 2 ppm CO , and 0 UHC; part-load—5.3 ppm NO_x , 8.5 ppm CO , and 1.2 ppm UHC.

Flameless catalytic combustion is not susceptible to the instabilities and dynamics that can occur in lean premixed systems. Thus, a catalytic combustor operates quietly, as observed in the GE tests.

Measurements of the dynamic pressure at a full-load test point in the GE tests resulted in an overall rms level of 0.46 psi (3.2 kPa), which is an order of magnitude below typical levels in lean premixed systems. The system also operated with a pressure drop through the reactor of about 2.6%.

The results supported the feasibility of installing this technology in an operating turbine system, which is currently in progress. The objective is a minimum 1-year catalyst life.

Solar

Full-scale tests were performed in 1997 at Solar Turbines Inc., San Diego, on a single-can catalytic combustion test stand as part of Phase III of the U.S. Department of Energy's Advanced Turbine System (ATS) program.

ATS seeks to develop a high-thermal-efficiency industrial gas turbine with ultra-low emissions (<5 ppm NO_x , <10 ppm CO , and UHC at 15% O_2) over the 50-100% load range.

System start-up and operation to 50% load were accomplished with a conven-

tional lean-premixed (LP) fuel injector. At 50% load, the system changes from LP operation to catalytic operation. A medium pressure ratio (≈ 9 atm) recuperated thermodynamic cycle (thermal efficiency 40%) was used.

The gas turbine was operated to keep the combustor inlet temperature relatively constant between 50 and 100% load.

The tests demonstrated the feasibility of obtaining ultra-low emissions over the 50-100% load range using variable geometry control. NO_x emissions <3 ppm were measured at all test points. To meet CO and UHC emissions goals of <10 ppm, the air flow into the catalyst was modulated with a variable geometry valve.

The catalyst wall temperatures varied 1,610-1,718° F. (1,145-1,210° K.) and were less than the desired maximum temperature of 1,831° F. (1,273° K.). The relatively uniform temperature measurements verify the homogenous fuel-air profiles at the catalyst inlet. The effects of a well-mixed gas mixture at the catalyst exit also were seen in relatively uniform combustor-exit temperatures.

Start-up and part-load operation of the system with a lean-premixed fuel injector were demonstrated.

Kawasaki

Full-scale operational tests are ongoing on a Kawasaki M1A-13A engine with Xonon. While the previous tests were conducted on test-stands, the Kawasaki tests being conducted in Tulsa are the first full-scale tests conducted on an actual operating turbine engine (Fig. 3).

The engine has achieved more than 1,100 operating hr and 220 cycles of start-up/shut-down.

The tests have demonstrated that the turbine-inlet temperature profile can be made to be identical to that of a conventional diffusion-flame combustor. That is, Xonon was designed to match the turbine-inlet temperature and the pressure drop (ΔP) of a standard combustor. This design ensures no impact on turbine performance.

Extensive load tests conducted on the Kawasaki engine have validated full power output and efficiency within 0.5% of a standard combustor.

A control system was developed for and tested on the Kawasaki engine. The system incorporates state-of-the-art, feed-forward and model-based control features that allow the engine to be started and accelerated to its ideal condition.

The engine has been started more than 220 times in ambient conditions that

range 10-98° F. Based on current test results, the starting control algorithm has repeatedly proven to be safe for both the Xonon combustion system and the engine. As the tests continue, the starting control strategy will be further developed to cover a wider range of ambient conditions.

The Kawasaki tests have demonstrated the ability to meet emissions targets from baseload down to as low as 50% load conditions. The tests have consistently resulted in NO_x emissions of <3 ppm and CO and UHC of <5 ppm.

Combustor dynamics also were achieved over the entire operating load range. The measured dynamics were <0.1 psi/dynamic pressure pulsation.

Regulatory factors

Under current federal regulations for nonattainment areas (areas that do not meet the ambient air-quality standards—about 85% of the U.S.), the net emissions impact for a new project (or significant modification to an existing facility) must be offset by reducing emissions at other facilities.

A "significant" modification, according to 40 CFR 51.160, ranges 40-250 tons/year.

An effective NO_x control technology reduces offset requirements by reducing

the net increase in emissions for a power project.

Xonon also can generate emissions-reduction credits (ERCs) because it reduces emissions below levels required by regulation. Xonon also can help the facility avoid Title V costs and constraints by enabling a facility that retrofits with emissions controls to get below the Title V threshold.

Xonon results in no known adverse environmental impacts, saving time and expense for mitigation measures, monitoring, and reporting requirements.

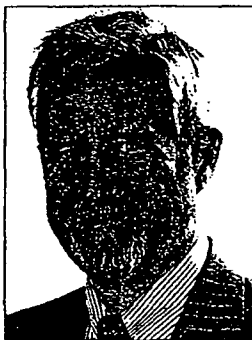
Because Xonon is a pollution prevention technology, rather than an exhaust clean-up system, an SCR is not required. This will save an end user substantial expense.

Selecting the most effective NO_x emission control technology will shorten the permit timetable and help owners/operators avoid "ratcheting" whereby they must repeatedly retrofit existing equipment to achieve increasingly stringent NO_x emission standards.

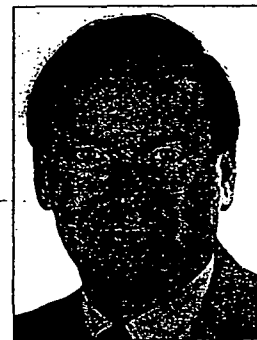
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Solt



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THE ULTIMATE NOx SOLUTION FOR GAS TURBINES

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ABSTRACT

Since the introduction of emission standards for gas turbines in the late '70s and early '80s, the gas turbine industry has responded with a variety of combustion and cleanup alternatives that have improved emissions. While the emissions were being reduced, the cost of control, and the negative environmental impacts were often significant.

Thanks to a technological breakthrough, catalytic combustion has now been achieved, and can fulfill the promise of low cost NOx elimination without the high cost of SCR or the operational problems associated with Lean Pre-Mix.

NOx Formation

NOx is composed of oxygen and nitrogen, so the air entering the engine, consisting of 21% oxygen and 79% nitrogen, contains all the ingredients necessary to produce this pollutant. The only additional factor that is required is a temperature high enough to cause oxygen and nitrogen to combine (see Fig 1). Turbine manufacturers try to prevent the formation of NOx primarily by reducing the peak flame temperature below the range in which NOx is formed.

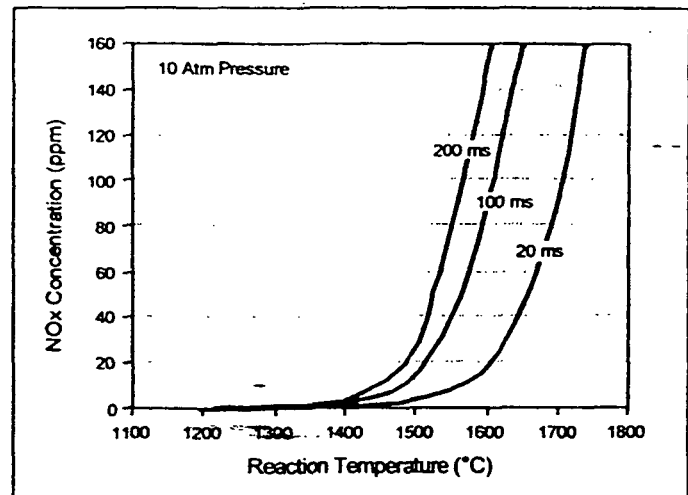


Figure 1. NOx Formation as a function of Time and Temperature

Diffusion Flame Combustion

Before the concern about NOx emissions arose, gas turbine manufacturers primarily aimed at building a rugged, long-life combustor with a good temperature distribution, reliable light-off, and which would not flame out under transient load conditions. To achieve these design goals it was helpful to burn the fuel under conditions that were very close to stoichiometric, that is, conditions where there is just enough oxygen to burn all of the fuel. Under

stoichiometric conditions, the fuel burns at the highest possible temperature in the primary combustion zone, so these conditions produce large amounts of NO_x.

Dry Control

Following the introduction of NO_x control requirements, turbine manufacturers examined the possibility of operating away from high-temperature stoichiometric conditions. Operating under lean conditions, where there is more air in the primary combustion zone than is necessary to burn all the fuel, lowers the peak temperature and reduces NO_x formation. This was referred to as "dry control", and usually resulted in a NO_x reduction of only 10-20%.

Wet Controls

The turbine manufacturers next developed wet controls. These controls inject water or steam into the primary combustion zone along with the fuel. The water or steam serves as a diluent that reduces peak flame temperature and hence NO_x formation. The advantage of water is that it requires only about half as much water as does steam to obtain a given amount of NO_x reduction. Consequently, water introduces fewer contaminants than does steam, assuming the water and steam are of the same quality. Both water and steam increase the power output because there is more mass flow through the engine, but they also increase the maintenance costs. Water injection also greatly increases the fuel consumption for a given amount of power. Steam injection reduces fuel consumption. However, if there is another use for steam at the facility, fuel will be required to replace the steam injected, so both water and steam injection significantly increase the overall fuel requirements. Applications of these technologies can result in a substantial increase (>50 ppm) in CO and UHC.

Lean Premixed Technology

Turbine manufacturers then developed processes that use air as a diluent rather than water or steam. Manufacturers achieved this by premixing the fuel and air before they enter the combustor. This type of process is called *lean premix combustion*. Lean premix combustion processes developed by gas turbine manufacturers have a variety of names, including the Dry-Low NO_x (DLN) process of General Electric, the Dry-Low Emissions (DLE) process of Rolls-Royce and the SoLoNO_x process of Solar Turbines.

Most industrial gas turbine manufacturers have programs to develop lean premix combustion systems. Most of the commercially available systems are guaranteed to reduce NO_x emissions to a level in the range of 25-42 ppm, depending on the manufacturer and the particular turbine model. A few manufacturers have guaranteed lower emission levels, but some of these manufacturers are experiencing problems with combustion noise and combustor deterioration. Applications of these technologies can result in a substantial increase (>50 ppm) in CO and UHC.

SCR

Another approach to controlling NO_x is to remove the NO_x from the turbine exhaust. A number of technologies are available to remove NO_x from exhaust streams. The first of these technologies to be developed was Selective Non-Catalytic Reduction (SNCR), which is the basis of a proprietary Exxon process called Thermal DeNO_x. In this process ammonia is injected into the combustion products at a temperature of about 900°C (1650°F) and the NO_x reacts with the ammonia producing nitrogen and water. However, this process is not applicable to gas turbines because the required temperature of 900°C (1650°F) occurs in the middle of the expansion section, so it is not possible to achieve good mixing with the injected ammonia. Fuel Tech has developed a similar SNCR process, called NO_xOut, based on urea rather than ammonia. Although this process operates at lower temperatures than the Exxon process, it still requires too high a temperature to be applicable to gas turbines.

Another technology for removing NO_x from exhaust is Non-Selective Catalytic Reduction (NSCR), which has been used successfully for a number of years with reciprocating engines (piston engines). However, this technology requires operating under rich, rather than lean conditions, which is not possible for gas turbine systems.

A third technology is Selective Catalytic Reduction (SCR). In SCR, the NO_x reacts with an injected reducing agent, usually ammonia, on the surface of a catalyst. The required temperature is much lower than for SNCR processes, such as Thermal DeNO_x or NO_xOut, so SCR processes have been used successfully with gas turbines for several years. SCR typically produces a reduction of 80% in the level of NO_x entering the catalytic unit. The operating temperature of an SCR unit is usually too low to allow the turbine

exhaust to be injected directly into the unit. Instead the exhaust first enters a heat recovery device, such as a boiler, with the SCR unit placed in the middle of the device. This is a very common arrangement in gas turbines with heat recovery equipment and should certainly be addressed in permit applications for gas turbines.

SCR is a relatively expensive control technology, so it may not be cost-effective if the economic impact is evaluated on an incremental basis. However, if the economic impact is evaluated on a total basis, with SCR combined with water injection, for example, then SCR may appear to be cost-effective. The economic impact of SCR combined with one of the dry low NOx technologies is essentially the same on a total or incremental basis, since the starting point is the level of NOx produced by the turbine using the dry low NOx technology.

The lower the level of emissions from the gas turbine the less cost effective SCR technology will be. With a control technology that reduces NOx to extremely low levels, SCR will never be economically viable and applicants will not be forced to use this technology. For this reason it is often worthwhile to consider control technology that reduces NOx to very low levels.

Catalytic Combustion

Catalytic combustion has also been investigated for a number of years as a means of controlling NOx in gas turbines. An advantage of catalytic combustion is that it is flameless combustion, as the fuel and air react on a catalytic surface. There has been a major breakthrough in catalytic combustion recently, the XONON Flameless Combustion™ control technology, developed by Catalytica Combustion Systems Incorporated (CCSI), achieves 3 ppm NOx with CO and UHC < 10 ppm.

This catalytic combustion technology, which is the result of several key inventions, is a breakthrough in providing ultra-low emissions for both current and future gas turbine engines. This technology is the "ultimate" step in pollution prevention for gas turbines.

Over the last five years, CCSI has developed a proprietary catalytic combustion system. This system is now in commercial demonstration.

The catalytic combustion system, which is completely

contained within the combustor of the gas turbine, is a new way to carry out combustion that prevents the formation of NOx while achieving low CO and UHC levels.

The success of the system results from a two stage combustion process in which about half of the fuel is combusted within the catalyst module, and the remainder burns homogeneously downstream of the catalyst. This process is flameless, and typically produces less than 1 ppm of NOx. Depending on the temperature of the air leaving the compressor (or recuperator), a pre-burner may be required to achieve the temperature required for the catalytic reaction. Where a pre-burner is used, most of the NOx (usually less than 3 ppm) is formed in the pre-burner.

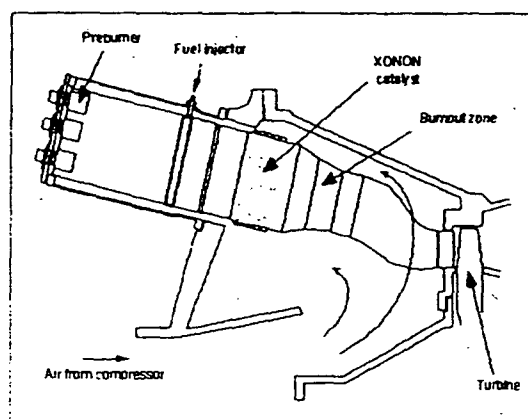


Figure 2. Catalytic Combustor System

There are two proprietary features of the system that allow it to succeed where other attempts have failed.

- The catalyst module incorporates a chemical thermostat that acts to limit the catalyst temperature even at relatively high fuel/air ratios, so that the gas temperature within the catalyst can be significantly below the turbine inlet temperature. This feature provides long catalyst module life and the ability to use the same technology for a variety of gas turbine inlet temperatures ranging from 825°C (1515°F) to 1500°C (2730°F).
- The catalyst module is composed of several sections, each designed to perform a specific function and achieve a specific operating temperature. This provides maximum flexibility, allowing engineers to design the optimum system for a specific gas turbine.

With the catalytic combustion system, the combustor can produce the very high outlet gas temperatures required for modern gas turbines, but the catalyst operates at a relatively low temperature. This allows the use of a metal substrate which provides good durability for the overall combustor system.

In both the catalytic combustion system and lean premix combustors fuel and air are premixed to minimize the peak combustion temperature. However, in the lean premix combustor the fuel-air mixture has a much higher combustion temperature than in the catalytic combustion system as a conventional flame must be generated and sustained at the very high gas velocities present in the lean premix combustor. The higher combustion temperature results in higher levels of NOx. If more air is mixed into the fuel in a lean premix system to further reduce the NOx level, the flame becomes unstable and combustor noise and vibration become problems.

In the catalytic combustion system the fuel-air mixture is very dilute; in fact, the mixture is so dilute that it would not support a conventional flame. Nevertheless the catalyst module can combust this fuel-air mixture without a flame. In addition, the catalyst is designed to combust only a portion of the fuel, providing the ability to control the gas outlet temperature from the catalyst module to a temperature that allows the use of a metal substrate for the catalyst. Downstream of the catalyst the remaining fuel combusts in a flameless homogeneous reaction that produces almost no NOx.

With extensive development, lean pre-mix combustion systems have only achieved NOx levels of about 25 ppm or, in a few cases, 15 ppm. With only a few years of development, full scale tests at turbine operating conditions for a variety of turbines, the catalytic combustion system has already demonstrated NOx levels of less than 5 ppm and is expected to achieve levels of 2-3 ppm in commercial operation. Figure 3 shows the applicability of the catalytic combustion system over a wide range of combustor outlet temperatures, including advanced turbine designs. Even at combustor outlet gas temperatures of 1500°C (2730°F), envisioned for the next generation of turbines, the NOx level is only 2 ppm.

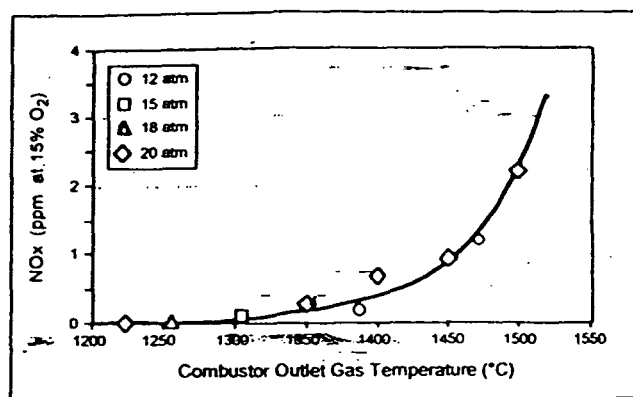


Figure 3. NOx emissions from a catalytic combustion system

Testing

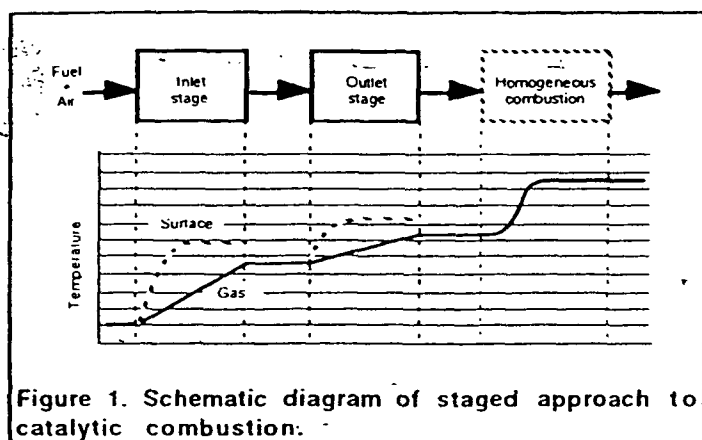
Testing continues on the at CCSI to determine parameters such as catalyst performance, operating range, durability, susceptibility to contamination, etc. In addition, full scale testing at actual turbine operating conditions has been completed at both Solar and GE on single cans in the turbine companies testing facilities. Both of these tests demonstrated compliance with the goals, and showed NOx emissions of less than 3 ppm and CO and UHC below 10 ppm.

The catalytic combustion system has now completed a 1000 hour test in an actual industrial gas turbine engine (KHI M1A-13). The catalyst module showed no deterioration. The testing was performed in a test cell using a dynamometer as load. The test included over 250 start cycles, and numerous load changes. Testing again demonstrated the ability of the catalytic combustion system to achieve less than 3 ppm NOx while holding CO and UHC below 10 ppm.

Next Phase, will include field testing to demonstrate durability and operation under actual field conditions. Several sites under consideration, and the testing should be underway by the time the ASME Gas Turbine Conference starts in June of '98.

Conclusion

CCSI is now designing commercial combustion systems that will be in operation in late 1998. They have announced a joint program with GE to make the technology available for retrofit on existing units, and are working with several gas turbine OEMs to make it available on new products.



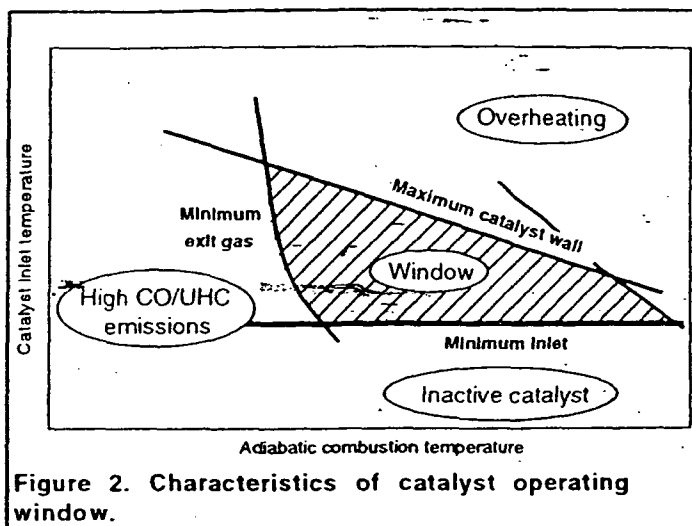
during the transients that accompany turbine operation. These durability issues have been a significant barrier to development of a viable catalytic combustion technology for gas turbines.

Over the past few years a catalytic combustion technology has emerged that successfully addresses the unique challenges of the gas turbine application. This technology uses catalysts that are designed to limit the extent of fuel combustion that occurs within the catalyst structure itself. By limiting the reactions in this way, such systems also limit the maximum catalyst temperature and thus broaden the selection of suitable catalyst components and extend catalyst life. This technology has been demonstrated in a number of subscale and full scale tests (Dalla Betta et al., 1994, 1995a, 1996; Beebe et al., 1995a). In tests of small scale [typically 51 mm (2 in) diameter] units, NO_x emissions ranged from ~1 ppmv at combustor outlet temperatures near 1300°C (2370°F) to ~2.3 ppmv at an outlet temperature of 1500°C (2730°F) (Dalla Betta et al., 1995b). In the work reported here, the focus is on the most recent full scale test, completed in June 1996.

CATALYTIC REACTOR DESIGN

Catalytica's approach to developing a viable catalytic combustion technology has been described previously (Dalla Betta et al., 1995a). Briefly, the technology involves a staged system in which a portion of the fuel is consumed within the catalyst, but the final combustion that generates the highest temperatures takes place in a volume downstream from the catalyst. The scheme is diagrammed in Fig. 1. Initial fuel combustion is accomplished stepwise in two or more catalyst stages, each designed for its own particular purpose and set of reaction conditions. Typically, about half of the fuel is reacted within the catalyst stages, and the remainder is burned via homogeneous combustion reactions after exiting the outlet stage catalyst. By isolating the highest temperatures downstream from the catalyst, this strategy circumvents many of the issues of high temperature catalyst stability that have deterred other approaches.

A catalytic combustion system designed according to the strategy depicted in Fig. 1 has a certain range of operating conditions over which it will provide the desired low emissions levels. This operating "window" can be described in terms of the two key factors that determine the reactor's performance --- the inlet



temperature and the adiabatic combustion temperature of the fuel-air mixture passing through the reactor. A generic diagram of such a window is shown in Fig. 2.

The window in Fig. 2 is constrained by three general features of the reactor's performance. First, the inlet temperature must be high enough for the catalyst to become active for methane oxidation. Unless this "minimum inlet" temperature is reached, the rate of the exothermic oxidation reactions occurring on the catalyst walls is too slow to generate the heat necessary to sustain system operation. A second constraint requires that the gas temperature at the exit of the outlet stage is high enough to initiate homogeneous combustion and CO burnout downstream from the catalyst (cf. Fig. 1). This temperature is affected predominantly by the adiabatic combustion temperature (i.e., the fuel/air ratio) in the reactor. If the adiabatic combustion temperature is too low, the "minimum exit gas" temperature will not be attained; and the downstream homogeneous combustion reactions will not achieve adequate elimination of CO and UHC emissions. The third constraint requires that the catalyst wall temperatures do not exceed their design limits. This constraint will be exceeded if the combination of catalyst inlet temperature and adiabatic combustion temperature places the operating point above the "maximum catalyst wall" temperature boundary. Each catalyst stage has its own individual temperature characteristics; so the "maximum catalyst wall" limit may not be a simple single line.

The operating window of any particular reactor design can be defined on the basis of testing of small scale prototype catalysts, typically 51 mm (2 in) in diameter. Experience has shown that such characterizations, if done under the same conditions of temperature, pressure, flow, and gas compositions expected in practice, are good indicators of full scale system performance (Cutrone et al., 1996). Extensive evaluations of prototype catalyst configurations led to the reactor design that was then scaled up for the full scale tests reported here.

The catalytic reactor consisted of three individually supported stages, each 508 mm (20 in) in diameter. Mechanical support was provided by large-cell honeycomb disks 13 mm (0.5 in) thick made

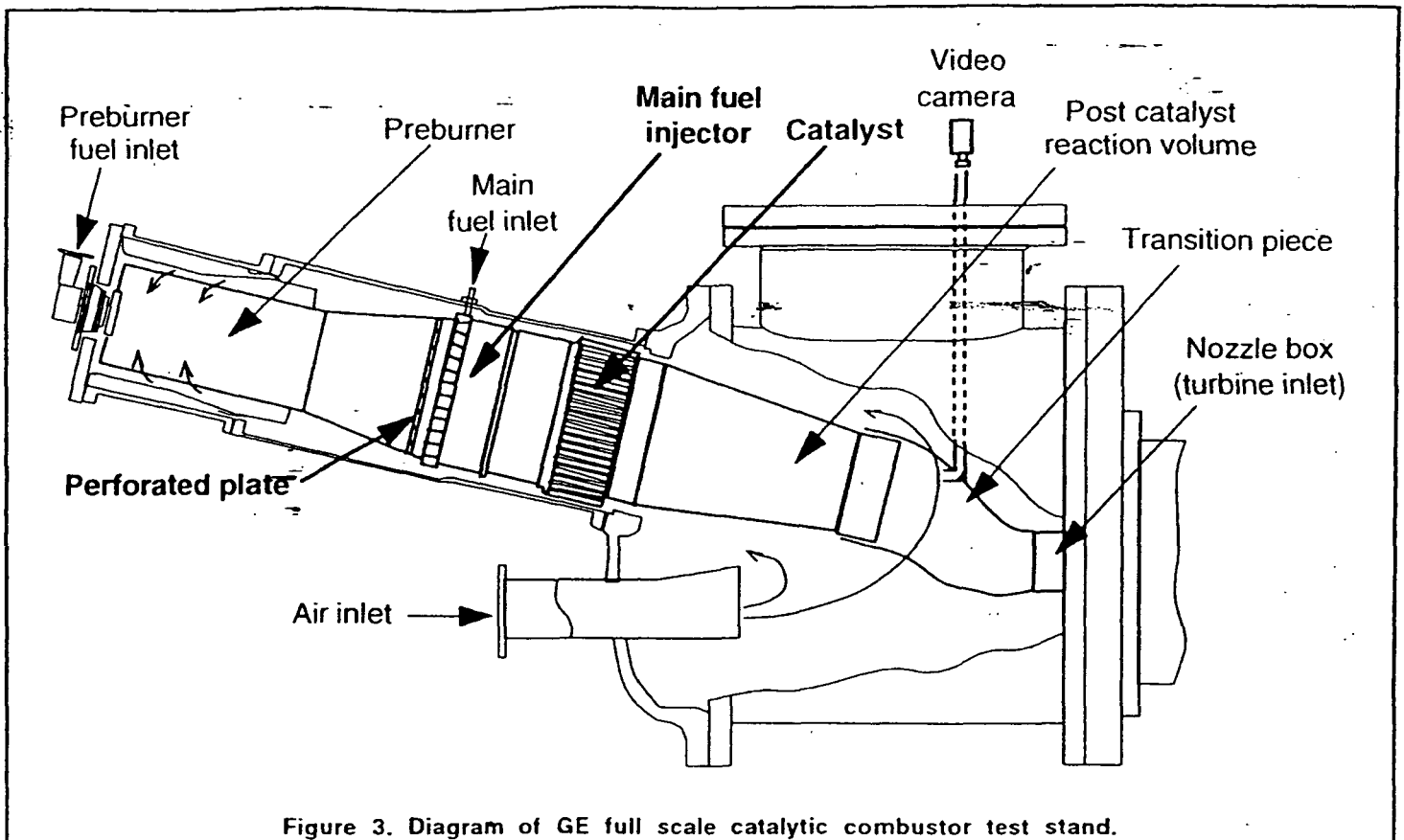


Figure 3. Diagram of GE full scale catalytic combustor test stand.

of Haynes Alloy 214 and attached to the walls of the container. The catalyst stages were formed by corrugating strips of oxidation-resistant metal foil 50 μm (0.002 in) thick and then depositing the active catalytic material as a coating on the strips. The strips were coiled in order to form channeled monolithic structures through which the fuel-air mixture could pass and react on the channel walls. The overall length of the catalyst container was 305 mm (12 in), with the catalyst itself occupying about 230 mm (9 in). Included in the reactor instrumentation were a dozen thermocouples and twenty gas sampling probes arrayed across the inlet face of the inlet stage catalyst to characterize the uniformity of the temperature and fuel/air ratio at that location.

COMBUSTOR DESIGN

Testing at full scale has been done in a catalytic combustor system developed by GE for its MS9001E gas turbine. The MS9001E combustor operates with a full load firing temperature of 1105°C (2020°F) and a combustor exit temperature of about 1190°C (2170°F). The key components of the test stand at the GE Power Generation Engineering Laboratories in Schenectady, NY, are shown in Fig. 3.

There are four major subassemblies in the overall combustion system: the preburner, the main fuel injector, the catalytic reactor, and the downstream liner leading to the transition piece. The functions of these hardware elements have been described in prior

reports (Dalla Betta et al., 1996; Beebe et al., 1995b). To summarize, their roles are:

Preburner - The preburner carries the machine load at operating points where the conditions in the catalytic reactor are outside of the catalyst operating window. Most often, these are the low load points where the fuel required for turbine operation is insufficient for the catalyst to generate the necessary minimum exit gas temperature (cf. Fig. 2). As the turbine load is increased, progressively more fuel is directed through the main injector and progressively less goes to the preburner. Ultimately, the preburner receives only enough fuel to maintain the catalyst above its minimum inlet temperature.

Main fuel injector - This unit is designed to deliver a fuel-air mixture to the catalyst that is uniform in composition, temperature, and velocity. A multi-venturi tube (MVT) fuel injection system was developed by GE specifically for this purpose (Beebe et al., 1987). It consists of 93 individual venturi tubes arrayed across the flow path, with 4 fuel injection orifices at the throat of each venturi.

Catalytic reactor - The role of the catalyst was described earlier; it must burn enough of the incoming fuel to generate an outlet gas temperature high enough to initiate rapid homogeneous combustion just past the catalyst exit.

Downstream liner - This is the location of the final combustion reactions that complete the oxidation of the fuel and any remaining CO in order to achieve ultra low emissions. In general, the homogeneous reactions must be completed prior to injection of any dilution air into the hot gas path.

Three particularly important features of the combustion system for the most recent test (June 1996) are indicated with bold type in Fig. 3. In prior tests, a comparatively cooler region was commonly observed at the center of the reactor in the video images, and the range of measured fuel/air ratios at the catalyst inlet was broader than desired (Beebe et al., 1995a). Two changes were made in response to these observed non-uniformities.

First, the low temperature in the center was correlated with a consistently low fuel/air ratio in that area. In off-line tests done at atmospheric pressure, this feature was subsequently attributed to a region of higher than average air flow down the centerline of the combustor. The center peak in the velocity distribution was most probably caused by detachment and consequent slowing of the gas flow near the high-angle diverging walls at the preburner diffuser section (cf. Fig. 3). Installation of a perforated plate at that location provided an expedient method of smoothing the non-uniform velocity profile entering the main fuel injector.

Second, bench testing of the MVT fuel injection unit subsequent to the January 1996 full scale test showed variations in the fuel flows among the 93 venturis. The locations of the outliers in fuel flow could be correlated with the locations of temperature extremes in the video images recorded during the January 1996 test. An extensive cleaning process followed by individual tailoring of any remaining off-spec injector orifices resulted in significant improvements in the uniformity of the fuel flow through the MVT.

Finally, it has been demonstrated consistently in this program (and was again in the most recent tests) that the measured NO_x emissions are derived almost exclusively from the diffusion flame in the preburner (Beebe et al., 1995b). Consequently, the NO_x levels are determined primarily by the amount of fuel burned in the preburner, i.e., by the preburner temperature rise. Through the course of this development program, the inlet stage catalyst has been modified to improve its operability at lower inlet gas temperatures, and thus the temperature rise required from the preburner has been steadily decreasing. These improvements have had the intended impact in decreasing NO_x emissions, as will be shown below.

TEST PROCEDURE

Experimental data were obtained over a range of test conditions from full speed no load (FSNL) simulation to base load simulation for the GE Model MS9001E gas turbine. The combustor discharge temperature at the entrance to the first stage nozzles (T3.95) ranged from 541°C (1006°F) at the FSNL simulation to 1193°C (2180°F) at the base load simulation. The continuously recorded data included flow rates, inlet and exit temperatures and pressures, dynamic pressures, and emissions. Additional temperature data and visual images were recorded via the video system throughout the test. At appropriate test points, conditions were maintained steady for a period of approximately 30 min in

order to analyze the fuel concentration at each of the 20 sampling points at the catalyst inlet.

Reactor operation was started by first heating the system with the preburner to a temperature above the minimum required by the catalyst and then starting fuel flow through the main fuel injector. This procedure resulted in a smooth lightoff of the reactor with a uniform temperature profile across its face. The total air flow and fuel flows to the preburner and the main injector were adjusted to simulate various load conditions and to estimate the operating range over which the catalyst could achieve emissions targets. The catalyst could be extinguished simply by turning off the fuel supply to the MVT injector, and could be restarted just as simply by repeating the startup sequence. During the June 1996 test, the catalyst was fueled and at its operating temperature for a total of about 9 hours. The inlet and middle catalyst stages had been used in earlier full scale tests, so their accumulated exposure to combustor operating conditions was in excess of 25 hours.

RESULTS: UNIFORMITY

Prior full scale tests showed clearly the necessity for making the inlet conditions to the catalytic reactor as uniform as possible. With the hardware improvements described above, the preburner and MVT fuel injector delivered significantly flatter profiles of temperature and especially fuel/air ratio than were generated in the earlier tests. A comparison of the distribution of fuel/air ratios measured at the catalyst inlet during the January 1996 test (Dalla Betta et al., 1996) and during the most recent test (June 1996) is shown in Fig. 4. The target for fuel/air ratio uniformity was $\pm 5\%$ around the mean value, or a maximum range of 10% between the highest and lowest of the 20 concentration measurements. The range in previous tests was typically about 20%, with some data sets covering a range as high as 30%. Figure 4a shows an example with a range of 21%; where a sizable fraction of the inlet face was exposed to fuel concentrations outside of the target range. In contrast, Fig. 4b depicts data taken at full load conditions in the June 1996 test. In this case the maximum measured range of 12% was only slightly above the target of 10%, and as a consequence a much smaller fraction of the catalyst was operating outside of the $\pm 5\%$ target range.

The catalyst inlet temperature distribution is governed by the temperature pattern generated in the preburner. Other than the installation of the perforated plate, no modifications were made in the preburner section for the recent test. The temperatures measured with the 12 thermocouples located at the reactor inlet under simulated full load conditions typically covered a range of about 18°C (32°F). Although a narrower range is desirable, this temperature distribution was adequate for the purpose of these tests.

The importance of the inlet temperature and fuel/air ratio in determining catalyst performance was discussed above in reference to the operating window (Fig. 2). Figure 5 shows the boundaries of the operating window for the specific catalyst design used in the June 1996 full scale test, as characterized using the same catalyst configuration in the subscale test rig at Catalytica. The shaded area represents the most desirable operating range for achieving both low emissions and low catalyst temperatures. Operating points above the dashed line are suitable as well, although the higher

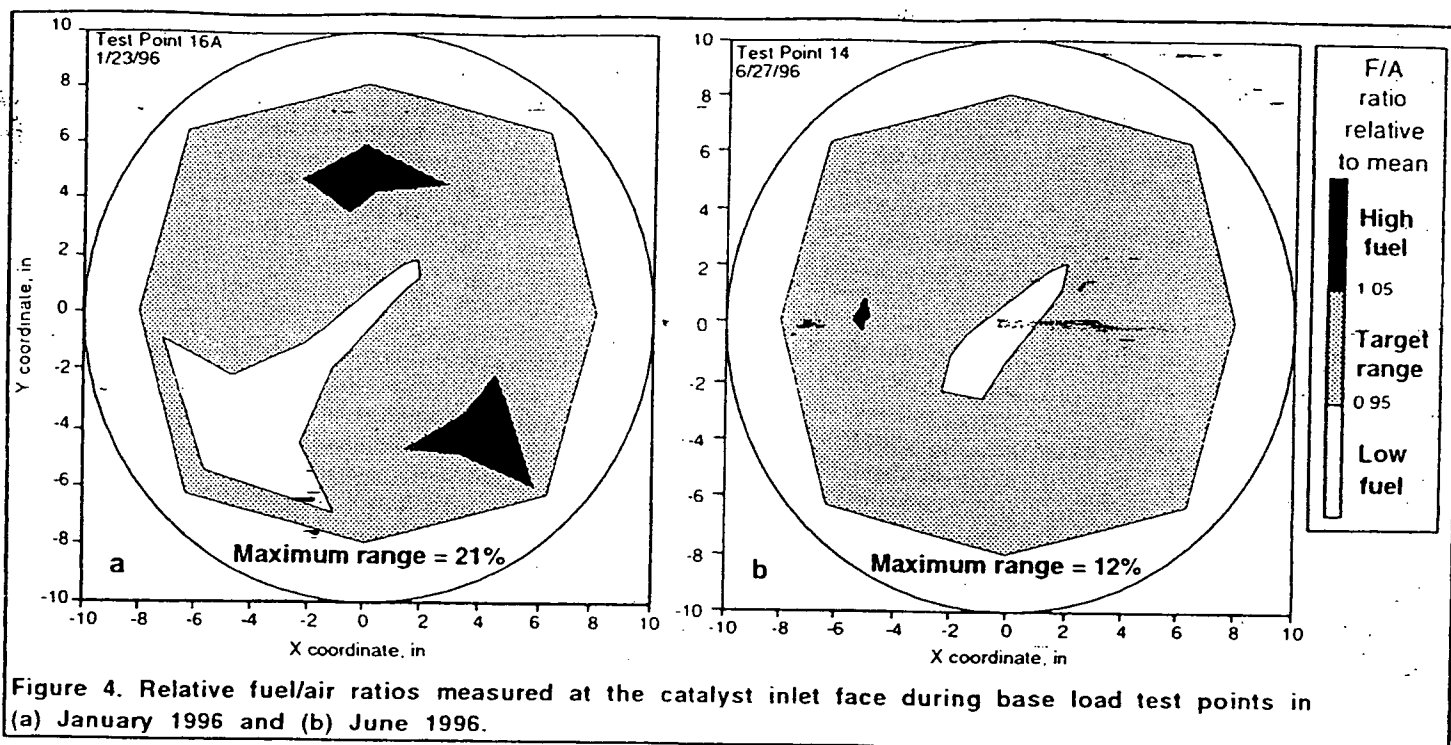


Figure 4. Relative fuel/air ratios measured at the catalyst inlet face during base load test points in (a) January 1996 and (b) June 1996.

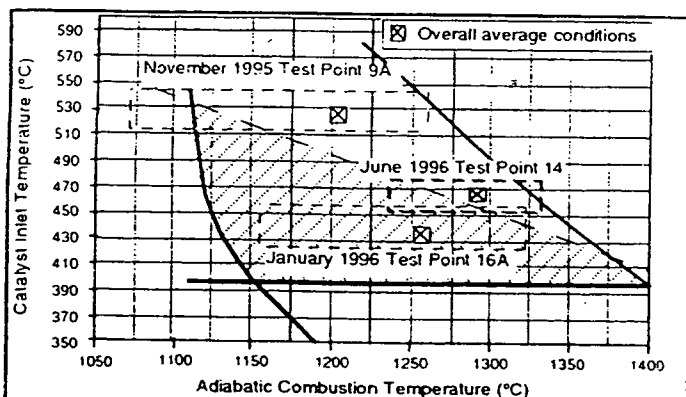


Figure 5. Operating window of catalyst configuration used in full scale tests. Dashed rectangles indicate decreasing degree of non-uniformity observed during successive full scale tests on three separate occasions.

catalyst wall temperatures at such conditions, while still below their maximum, are less attractive from the standpoint of long-term catalyst durability. Overlaid on the window diagram are dashed rectangles representing the measured ranges of inlet temperatures and fuel concentrations (converted to adiabatic combustion temperatures) from the three most recent full scale tests.

The problem with a broad distribution of the inlet conditions is evident in Fig. 5. In November 1995, for example, the range of fuel/air ratios measured at the inlet sampling points was so wide

that portions of the reactor were operating beyond the maximum wall temperature limit while other portions were so under-fueled that they could not achieve burnout of CO and UHC emissions. The distribution of fuel concentrations was narrowed slightly in the January 1996 test relative to November 1995. It appears from the diagram that low emissions should have been attained at Test Point 16A, since the inlet conditions everywhere were within the operating window. However, an air leakage path around the catalyst container allowed an appreciable flow of cooling air into the post catalyst reaction volume, and the resulting quenching of the homogeneous reactions prevented full combustion of residual CO and UHC.

The rectangle representing the June 1996 situation in Fig. 5 shows the marked improvement in the uniformity of inlet conditions compared with the prior tests. With this level of uniformity, the operating point can be changed to other inlet temperatures and/or other adiabatic combustion temperatures while maintaining the inlet conditions for all portions of the catalyst within the boundaries of the operating window. This capability was demonstrated in the test and will be discussed further below.

RESULTS: REACTOR PERFORMANCE

Base load CO and UHC performance

After the startup sequence described above, the air flow and total fuel-flow were adjusted to be representative of base load conditions for a GE MS900JE combustor. The temperature at the nozzle box (cf. Fig. 3) was set accordingly at 1193°C (2180°F). A portion of the total air flow bypasses the catalyst and enters the hot gas path at locations downstream from the reactor, so the ratio of

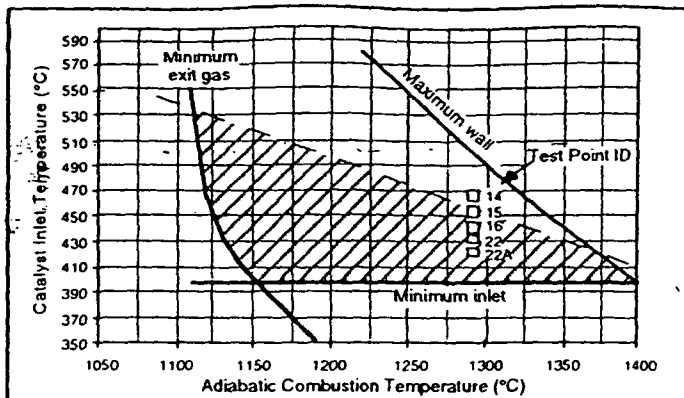


Figure 6. Average inlet conditions at five base load test points.

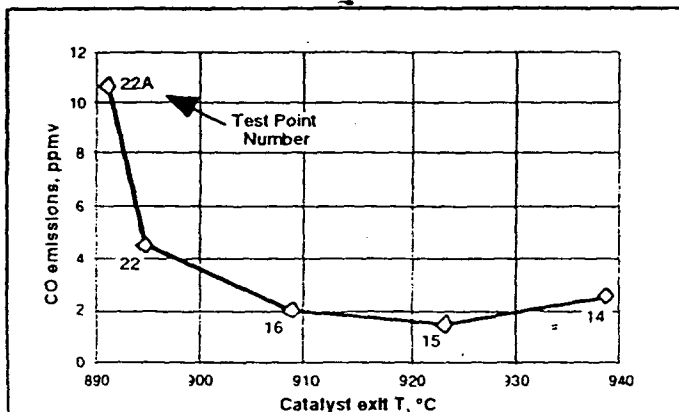


Figure 7. CO emissions measured at various average gas temperatures at the catalyst exit.

fuel flow to air flow within the catalyst itself is slightly higher than the overall fuel/air ratio supplied to the combustor. The amount of bypass air is difficult to quantify with the test stand at full pressure and temperature; it is estimated at 6-12% of the total air flow. At 12% bypass, the adiabatic combustion temperature in the catalyst would be roughly 1290°C (2350°F) at the base load operating point.

At the initial simulated base load operating point (Test Point 14) with the catalyst inlet temperature at 463°C (847°F), CO emissions were measured to be 2.5 ppmv, and the concentration of UHC was below the detectability limit of the analyzer. The capability of the catalyst to operate at base load with lower inlet temperatures was then investigated by decreasing the fuel flow to the preburner and increasing the fuel flow to the main fuel injector by the same amount in order to maintain the combustor outlet temperature at 1193°C (2180°F). This procedure was continued until the CO emissions rose above the design target of 10 ppmv (at Test Point 22A). The location of the sequence of five such test

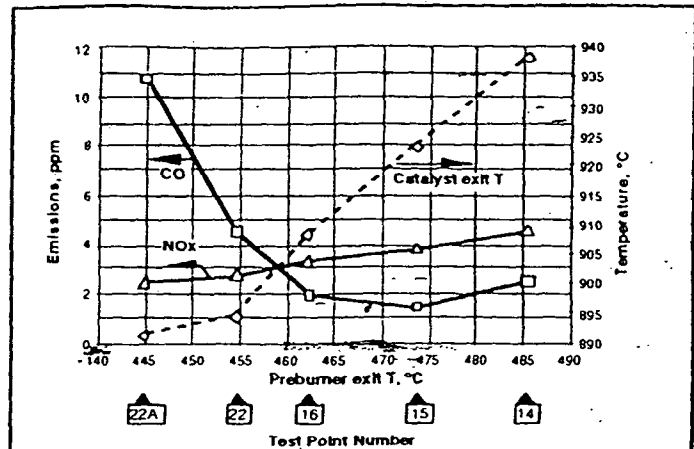


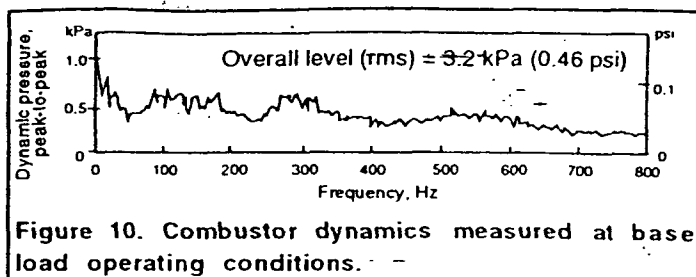
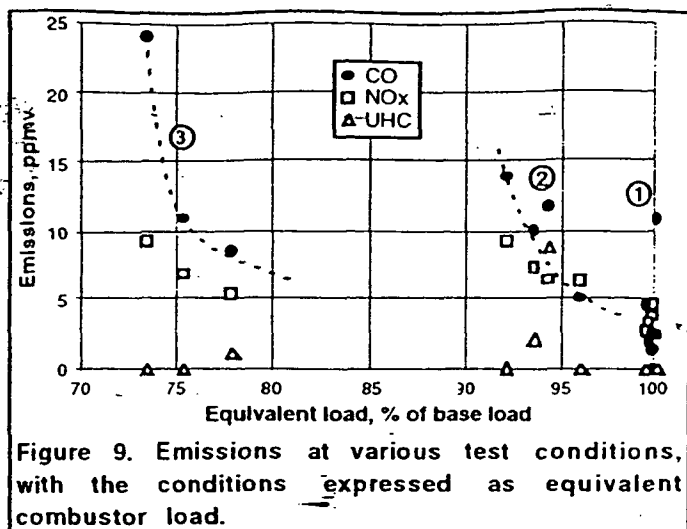
Figure 8. Effect of preburner exit temperature on catalyst exit temperature and emissions of CO and NOx at base load test points.

points in relationship to the catalyst operating window is shown in Fig. 6. [Note: The Test Point ID numbers refer to conditions on a predetermined test plan; they do not necessarily correspond to the order in which the testing was carried out.]

In the homogeneous combustion section downstream from the catalyst, the rate of CO oxidation is slower than that of the fuel (mostly methane). Thus the UHC emissions are always lower than the CO emissions, and the CO emissions are the most sensitive indicator of the overall performance of the catalytic combustion system. During the sequence of test points shown in Fig. 6, the gas temperature at the catalyst exit decreased as the preburner (and catalyst inlet) temperature was lowered. The effect of the catalyst exit gas temperature on the measured CO emissions is shown in Fig. 7. Judging from the figure, an outlet gas temperature above about 892°C (1638°F) was necessary for the reactor to achieve CO below 10 ppmv at the outlet of the combustor. UHC emissions were below the detection limit of the analyzer at all five points shown in Figs. 6 and 7.

Base load NOx performance

The discussion of CO performance suggests a strategy of operating the catalyst (and the preburner) at the maximum inlet temperature level commensurate with the overheating constraint on the catalyst walls. A limitation on such a strategy comes from the fact that the diffusion flame in the preburner produces NOx in direct relation to the temperature rise through the preburner. The effect of the preburner exit temperature on emissions and the catalyst exit temperature is plotted in 8. The graph shows the tradeoffs involved in selecting an appropriate preburner exit temperature for this particular catalyst system. The best CO performance is achieved at the highest preburner temperatures, but at the expense of higher NOx emissions and higher catalyst wall temperatures than if the preburner is operated at a lower temperature. For the base load test points depicted in Figs. 6-8, the amount of fuel burned in the



preburner ranged from 8% (at Test Point 22A) to 12% (at Test Point 14) of the total fuel supplied to the combustor.

It should be remembered that the NOx emissions from this catalytic combustion technology are derived almost exclusively from the preburner. This result has been documented in prior full scale tests (Beebe et al., 1995a; Dalla Berta et al., 1996) and was likewise confirmed in this work. In the present test stand, the preburner is a standard diffusion flame device; no modifications were made to reduce the NOx production. To the extent that the emissions profile of this diffusion flame preburner could be improved by introducing modern lean premixed combustion technology, the NOx emissions from the overall combustor system would be reduced accordingly.

Turndown performance

Several tests were done to investigate the response of the catalytic combustor to deviations from the base load operating point, particularly to changes that represented a decrease in the turbine load. The various test conditions (air flow, pressure, combustor exit temperature) were expressed in terms of their load equivalents as calculated for the GE 9E turbine cycle. The emissions measured at a variety of test conditions are shown in Fig. 9 versus the respective equivalent load. As noted above, CO emissions are the most sensitive indicator of reactor performance, and the target limit on CO emissions for this program is 10 ppmv.

Figure 9 shows three groupings of data points where the CO concentration was ultimately driven above the 10 ppmv program target. The first group of points (numbered "1" in the figure) at the 100% load condition has already been discussed. The CO concentration exceeded 10 ppmv when the preburner was turned down to the point at which the catalyst exit temperature became too low to achieve CO burnout within the available downstream residence time. The second group of points (numbered "2") were obtained by turning down the total fuel flow to decrease the combustor exit temperature. The air flow was maintained at the base load value. In order to maintain low CO emissions as the fuel/air ratio was turned down, the preburner exit temperature had to be

turned up. As the preburner exit temperature approached 540°C (1000°F), the NOx emissions from the preburner approached 10 ppmv, another program limiting target. Thus the ability to control CO levels below the 10 ppmv target was limited by the progressively higher NOx levels produced in the preburner. For example, at the lowest-load point of the second group of data points, the CO concentration was 14 ppmv. The catalyst wall temperatures were well within their design limits; so an increase in the preburner temperature could have brought the CO level down below 10 ppmv. However, the preburner NOx output was already at its limit of 10 ppmv; so the sequence of test points was discontinued. Again, a lean premix preburner design would probably extend the catalyst operating window in this situation.

The third set of data points in Fig. 9 provided a representation of the combustor conditions during an actual load turndown. In this case, unlike the second group of test points, the pressure and air flow were decreased in addition to the decrease in the fuel flow. This procedure more closely reflects combustor operation, and it results in a higher fuel/air ratio in the reactor during turndown compared with the simple fuel adjustment procedure used for the second set of data points. Just as for the second set of points, a limit was reached where the CO concentration could not be kept below 10 ppmv without exceeding 10 ppmv NOx from the preburner. However, a stable operating point was achieved that was equivalent to a 78% load condition while producing only 5.3 ppmv NOx, 8.5 ppmv CO, and 1.2 ppmv UHC.

RESULTS: TOTAL COMBUSTOR PERFORMANCE

One of the challenges facing lean premixed combustion technologies is the need to operate near the flammability limit of the fuel-air mixture fed to the combustor. The resulting potential for instability in the flame zone can cause pressure pulsations that are manifested as acoustic noise and vibrations in the combustor hardware, both of which are undesirable. In contrast, a catalytic combustor does not require a flammable mixture in order to operate. The flameless catalytic combustion is not susceptible to the sorts of instabilities and dynamics that can occur in lean premixed systems. Thus a catalytic combustor is expected to operate very quietly, and indeed that has been the observation in the full scale tests to date. Measurements of the dynamic pressure at a full load test point in the recent test are shown in Fig. 10. The overall rms level of 3.2 kPa (0.46 psi) is comparable to currently installed diffusion flame combustors and is significantly below the typical levels in lean premixed systems.

The improvements in generating uniform conditions at the catalyst inlet were reflected at the combustor outlet as well. The

**Table 1. System Performance
at Base Load and Part Load**

	<u>Base Load</u>	<u>Part Load</u>
Simulated load, %	100	78
Total air flow, kg/s (lb/s)	21.9 (48.2)	19.6 (43.1)
Pressure, kPa (psig)	1250 (167)	1110 (147)
Catalyst inlet T, °C (°F)	441 (826)	466 (871)
Combustor exit T, °C (°F)	1192 (2178)	1172 (2142)
NO _x , ppmv	3.3	5.3
CO, ppmv	2.0	8.5
UHC, ppmv	0.0	1.2

pattern factor is a measure of the temperature spectrum at the nozzle box and is defined as

$$\text{Pattern factor} = \frac{\text{Maximum T} - \text{Mean T}}{\text{Mean T} - \text{Inlet T}}$$

The pattern factor measured at the combustor exit at base load in the most recent test was 0.11, compared with a value of 0.13 under similar operating conditions in the January 1996 test. The program target is 0.10, a value matching the current GE 9E combustor performance.

SUMMARY

Since 1990, Catalytica, GE, and TEPCO have collaborated in the development of a catalytic combustion system for the MS9001E gas turbine. The combustor uses a staged catalyst to oxidize a portion of the fuel, and the remainder of the fuel is burned in a homogeneous combustion zone before entering the first stage nozzle. This scheme allows the catalyst to operate at temperatures that are low enough for metallic substrates while achieving the full design temperatures at the combustor outlet with single-digit emissions levels of NO_x, CO, and UHC.

For the most recent test, completed in June 1996, improvements in the uniformity of the catalyst inlet conditions provided the lowest emissions results measured to date in the full scale reactor. The catalytic reactor design was such that emissions targets were met both at simulated base load and part load test points. Data taken under both sets of operating conditions are summarized in Table 1.

The catalytic combustor system operated quietly and with a pressure drop through the reactor of about 2.6%. These factors, in addition to the ultra-low emissions levels, support the feasibility of installing this technology in an operating turbine system. Such an installation is currently in progress, with the objective of a one-year catalyst life.

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DEVELOPMENT OF A CATALYTIC COMBUSTOR FOR A HEAVY-DUTY UTILITY GAS TURBINE

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ABSTRACT

The most effective technologies currently available for controlling NO_x emissions from heavy-duty industrial gas turbines are either diluent injection in the combustor reaction zone, or lean premixed Dry Low NO_x (DLN) combustion. For ultra low emissions requirements, these must be combined with selective catalytic reduction (SCR) DeNO_x systems in the gas turbine exhaust. An alternative technology for achieving comparable emissions levels with the potential for lower capital investment and operating cost is catalytic combustion of lean premixed fuel and air within the gas turbine. The design of a catalytic combustion system using natural gas fuel has been prepared for the GE model MS9001E gas turbine. This machine has a turbine inlet temperature to the first rotating stage of over 1100°C and produces approximately 105 MW electrical output in simple cycle operation. The 508 mm diameter catalytic combustor designed for this gas turbine was operated at full-scale conditions in tests conducted in 1992 and 1994. The combustor was operated for twelve hours during the 1994 test and demonstrated very low NO_x emissions from the catalytic reactor. The total exhaust NO_x level was approximately 12-15 ppmv and was produced almost entirely in the preburner ahead of the reactor. A small quantity of steam injected into the preburner reduced the NO_x emissions to 5-6 ppmv.

Development of the combustion system has continued with the objectives of reducing CO and UHC emissions, understanding the parameters affecting reactor stability and spatial non-uniformities which were observed at low inlet temperature, and improving the structural integrity of the reactor system to a level required for commercial operation of gas turbines. Design modifications were completed and combustion hardware was fabricated for additional full-scale tests of the catalytic combustion system in March 1995 and January 1996. This paper presents a discussion of the combustor design, the catalytic reactor design and the results of full-scale testing of the improved combustor at MS9001E cycle conditions in the March 1995 and January 1996 tests. Major improvements in performance were achieved with CO and UHC emissions of 10 ppmv and 0 ppmv at base load conditions.

This ongoing program will lead to two additional full-scale combustion system tests in 1996. The results of these tests will be available for discussion at the June 1996 Conference in Birmingham.

NOMENCLATURE

CO = Carbon monoxide emissions
DLN = Dry Low NO_x
FSNL = Full Speed No Load
ISO = International Standards Organization
MVT = Multiple Venturi Tube type fuel injector
MWe = Megawatts electrical output
NO_x = Oxides of nitrogen emissions
ppm = Parts Per Million by volume
SCR = Selective catalytic reduction
UHC = Unburned Hydrocarbon emissions

INTRODUCTION

Trends in environmental regulations are necessitating use of clean burning fuels (particularly natural gas), advanced gas turbine combustion systems which reduce the amount of NO_x formed during the combustion process and, where emissions regulations are at the single-digit NO_x levels, use of Selective Catalytic Reduction (SCR) of the NO_x in the gas turbine exhaust. An example is California where NO_x levels of newly constructed combined cycle plants are regulated to as low as 5 ppm (at 15% O₂).

Consequently, the incentive now exists for development of a new generation of combustion systems capable of meeting NO_x emissions levels of approximately 3-5 ppm, directly within the turbine, without recourse to downstream denitrification by SCR in the turbine exhaust. This new generation of combustion systems should be suitable for turbines firing at today's turbine inlet temperatures of approximately 1290°C (at the inlet of the first stage rotor), with growth potential to the next generation of turbines expected to fire at approximately 1427°C. The costs associated with heat rate deterioration due to diluent injection, combined with capital and operating costs required for SCR systems, provides substantial economic incentive to develop ultra-low NO_x combustion systems for application to combined cycle and cogeneration power plants incorporating gas turbines.

Direct catalytic combustion has significant potential, as demonstrated by tests performed at GE for natural gas fuel with very low emissions of NO_x, CO and UHC. A promising concept for the catalytic combustion of natural gas has been developed by Catalytica/Tanaka Kikinzoku Kogyo K.K. In general terms, the design involves partially reacting the fuel-air mixture within the catalytic reactor to generate a gas temperature of

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about 800-1000°C at the reactor exit. The full adiabatic flame temperature is reached downstream of the reactor exit via homogeneous gas phase reactions. Due to the relatively low temperatures maintained in the reactor (<1000°C), the catalyst can include precious metals, and the substrate may be cordierite or metal. Low emissions (i.e., high combustion efficiency) have resulted when the temperature of the gas exiting the reactor was above ~980°C and the peak combustor discharge temperature was above ~1180°C. The concept has successfully demonstrated meeting emissions goals by both GE and Catalytica at reactor subscale sizes up to 75mm (3 in.) in diameter. Most recently, GE has developed a full-scale catalytic combustor system for its MS9001E gas turbine (firing at 1105°C turbine inlet temperature). The combustor incorporates a 508 mm (20 in.) diameter catalytic reactor designed and manufactured by Catalytica.

COMBUSTOR DESIGN FOR TEST 1 IN MARCH 1995

The catalytic combustion system design for the March 1995 Test 1 is shown in Figure 1. There are four major sub-assemblies in the total combustion system: the preburner, the fuel-air preparation system, the catalytic reactor, and the post reactor combustion liner.

The purpose of the preburner is to carry the machine load at operating conditions which yield catalytic reactor inlet temperature and temperature rise too low for satisfactory catalytic

combustion. The preburner also provides the necessary preheat to achieve catalytic reactor ignition and to sustain catalytic combustion at full load, design point conditions. The preburner is designed to operate from machine ignition up to a firing temperature (turbine inlet temperature) of approximately 700°C, which is designed as the start of catalytic staging. At this operating condition, the main fuel injector is fueled and ignition occurs in the catalytic reactor bed. From a machine firing temperature of 700°C to full load firing temperature of 1105°C (combustor exit temperature 1180°C), fuel flow to the main-fuel injector is continuously ramped up while fuel flow to the preburner is ramped down. In order to minimize NOx emissions, the preburner will be operated at the minimum temperature rise necessary to maintain a fully active catalytic reactor. Prior investigations by Dalla Betta, et. al. (1994) at reduced scale have indicated that the minimum catalyst inlet temperature required at baseload conditions is 450°C which would be obtained at a preburner temperature rise under 150°C.

The purpose of the fuel-air preparation system is to provide a mixture of fuel and air, or fuel and preburner products of combustion, to the catalytic reactor bed inlet with uniform distribution of mixture strength, pressure, velocity and temperature. A multi venturi tube (MVT) fuel injection system was developed for this purpose.

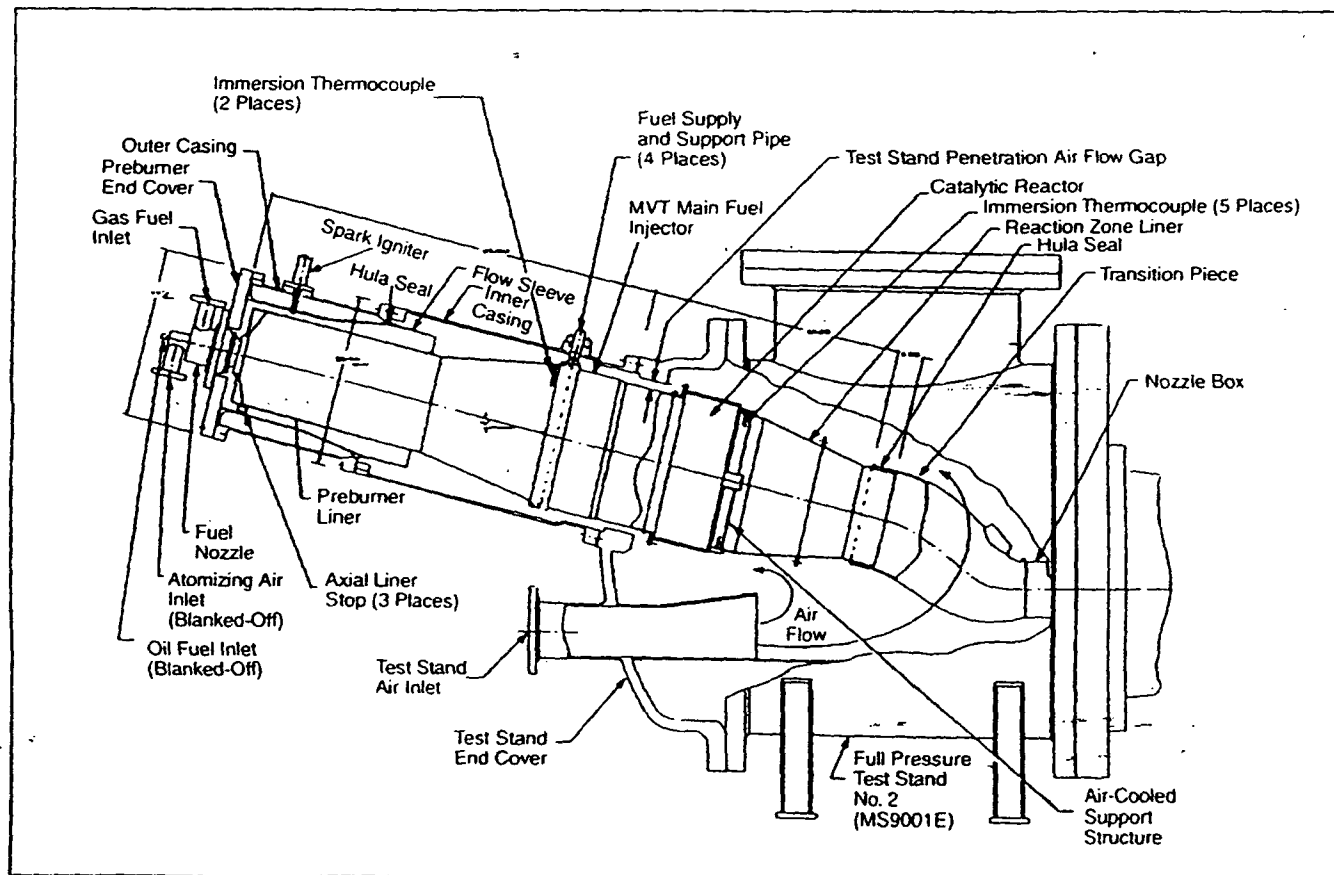


Fig. 1 Catalytic Combustion Test Rig for Full-Pressure Test 1 in March 1995

CATALYTIC REACTOR DESIGN

The major challenge in designing a workable catalytic combustor for a gas turbine is the high gas temperatures required at the turbine inlet. For example, the GE Model MS9001E requires that the combustors generate an exit gas temperature of about 1193°C (2180°F), and other models require still higher temperatures. An example is GE's FA class of gas turbines with turbine rotor inlet temperatures of approximately 1290°C (2350°F), and combustor reaction zone temperatures of nominally 1500°C (2732°F). Such temperatures are well beyond the maximum tolerable for most catalytic materials, and this requirement has in the past prevented application of catalytic combustion technology to gas turbines.

The catalytic reactor promotes the oxidation of hydrocarbons and carbon monoxide for lean mixtures at adiabatic flame temperatures below the threshold for thermal NO_x formation. The combustion process is initiated by the catalyst and is completed by homogeneous combustion in the post catalyst region where the highest temperatures are obtained. Catalytic reactor technology development has produced a bed which can operate with the full fuel and air flow required to operate the gas turbine while avoiding exposure of the catalyst to high temperatures which could cause deactivation and damage to the supporting substrate.

The catalyst must be designed to: 1) burn enough of the fuel to attain an outlet gas temperature sufficient to achieve low emissions via the downstream homogeneous combustion, and 2) burn the fuel in a manner that maintains the catalyst temperature below the maximum limit of the constituent materials. Some of the catalyst design issues have been discussed previously (Dalla Berta, et al. 1994). The primary challenge is to maintain the catalyst surfaces at temperature well below the adiabatic combustion temperature. Traditional catalyst designs do not achieve this: so the choices of catalytic materials for such designs have been limited to ceramics, which are a durability concern in heavy-duty turbine applications.

The present design takes advantage of the unique thermodynamics of palladium oxidation and reduction to control surface temperatures. Palladium oxide is highly active in catalyzing methane oxidation, while metallic palladium is appreciably less active (McCarty, 1994). The oxide decomposes to the metal at temperatures between 780°C and 920°C (1440°F to 1690°F), depending upon the pressure. This transition between palladium oxide and palladium metal can be used to limit the catalyst temperature, and this allows the option of using metal catalyst supports rather than ceramics.

The testing reported here was done using catalysts designed like those used in previous full-scale tests (Beebe, et al. 1995). The reactor consisted of three separate catalyst stages, each designed to deliver gas at the appropriate temperature to the subsequent stage or to the downstream homogeneous combustion section. Each stage was formed by corrugating a strip of oxidation-resistant metal foil 0.05 mm (0.002 in.) thick, and coiling the strip in such a way as to form a channeled monolith-

ic structure. The active catalytic material was deposited as a coating on the foils. The stages were separated and supported in the reactor container by large-cell honeycomb structures, 13 mm (0.42 in.) thick, made of Hastelloy X for full scale Test 1 and Cobot 214 for full scale Test 2. For Test 1, the overall length of the catalytic reactor was 200 mm (8 in.), and the flow path diameter was 508 mm (20 in.). The reactor for Test 2 had the same flow path diameter but the overall length was increased to 305 mm (12 in.). Figure 2 is a photograph of the instrumented reactor ready for insertion into the test stand combustor for Test 1.

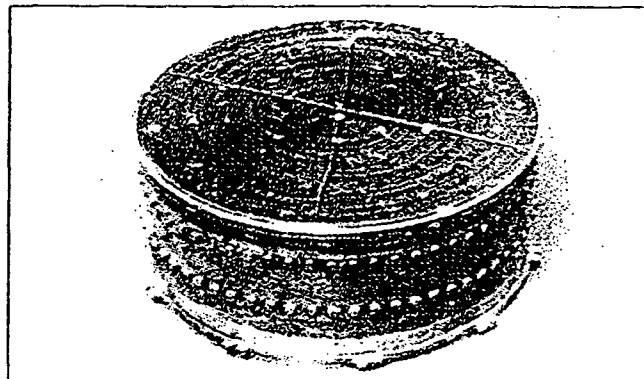


Fig. 2 Catalytic Reactor in Containment Can

FULL SCALE TEST RIG AND INSTRUMENTATION

The full scale testing discussed in this paper was conducted at the GE Power Generation Engineering Laboratory located in Schenectady, New York. The single burner test stand used for full-scale (reactor diameter of 508 mm), full pressure testing (pressure ratio of 11.7) of the catalytic combustion system duplicates a sector of the internal geometry of the MS9001E gas turbine containing one combustor of a machine set of fourteen. Figure 1 is a drawing of the full-scale catalytic combustion system test rig for Test 1 installed in the MS9001E full pressure combustion development test stand. The fuel used for all fired testing was natural gas supplied by a local utility company.

Gas sampling for emissions concentration measurements was done continuously. The gas sample was forced through the sample probe by the pressure differential between the test stand and ambient. The gas sample was cooled to room temperature and the condensate was removed. The sample gas then flowed through a "hot box" to the emissions console via a heated Teflon sample line. The sample was maintained at a constant pressure at the emissions console. The gas sample flow rate was much higher than needed for measurement in order to minimize residence time in the sample train. The excess sample was vented to atmosphere. All materials in contact with the sample gas were stainless steel glass or Teflon.

TEST RESULTS AND DISCUSSION FOR TEST 1

Experimental data were obtained over a range of test conditions from full speed no load (FSNL) simulation to base load simulation for the GE model MS9001EA gas turbine. The com-

burner discharge temperature at the entrance to the first stage nozzles (T3.95) ranged from 543°C (1009°F) at the FSNL simulation to 1195°C (2184°F) at the base load simulation. The data included inlet and exit temperatures and pressures, dynamic pressures and emissions. Additional temperature data and flame visualization were obtained using a video camera system looking at the rear face of the reactor through a viewing window in the transition piece. Reactor operation was started by first heating the system with the preburner and then initiating the main fuel flow through the reactor. This procedure resulted in a smooth lightoff of the reactor with a uniform temperature profile across the face of the reactor. The reactor could be completely extinguished simply by turning off the fuel supply to the MVT main fuel injector, and could be restarted by repeating the startup sequence. One shutdown/restart cycle was performed during the full-scale test.

NOx Emissions

Figure 3 presents NOx measurements corrected to ISO ambient and 15% percent oxygen concentration as measured at the test stand exit, versus average combustor exit temperature measured at the nozzle box. The data show a peak NOx value of 55 ppmv at a combustor exit temperature 519°C. The data presented in Figure 3 for combustor exit temperatures 519°C and below were taken at a constant pressure of 12.2 ATMA, the base load operating pressure of the MS9001EA gas turbine. Data for higher combustor exit temperatures were taken at design cycle conditions.

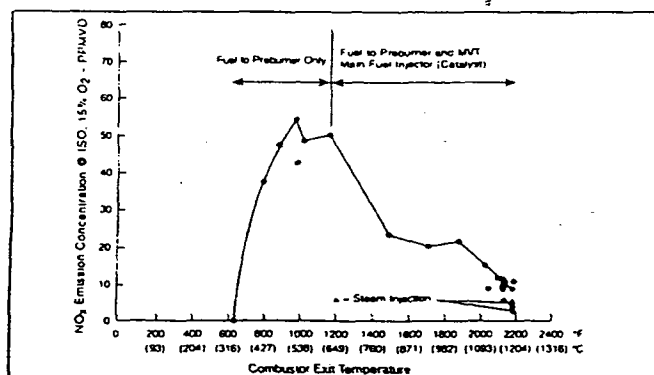


Fig. 3 Test 1, TEPCO/GE Catalytic Combustor, NOx vs Combustor Exit Temperature

The highest level of NOx measured under simulated machine cycle conditions is the 51 ppmvd point at 626°C combustor exit temperature. This relatively high NOx level results from the diffusion flame in the preburner. Up to this point only the preburner was fueled with no fuel delivery to the MVT main fuel injector and catalyst. At 626°C exit temperature, the combustion system temperature rise occurs in the preburner; and as a result, NOx levels are maximum for machine cycle conditions. As the combustor was taken to higher combustor exit temperatures, the temperature rise across the preburner decreased as fuel was shifted to the MVT main fuel injector, while temperature rise in the catalytic reactor and post catalyst combustion

zone increased. The data show that during this transition, NOx emissions drop to a level of approximately 11 ppmvd, dry. The higher than desired NOx was caused by the level of preburner exit temperature required to keep the catalytic reactor fully active. To demonstrate that the total NOx observed was generated almost entirely by the preburner, a small amount of steam was injected into the preburner reaction zone via the preburner fuel nozzle atomizing air passages. Results are shown in Figure 3 as the two points labeled, "steam injection." These points correspond to steam to preburner fuel mass ratios of 1.02 and 1.17. NOx emissions were 5 ppmvd and 3 ppmvd, respectively, which is consistent with existing data for NOx suppression by steam injection for diffusion flame combustors burning natural gas (Touchton, 1984), and confirmed that all measured NOx was generated in the preburner. This was further demonstrated during the initial test points when fuel was supplied to the preburner but not the catalyst. These points were designed to quantify the relationship between the preburner temperature rise and the resulting NOx production. The total NOx emissions from the combustor are the sum of the NOx produced by the preburner and NOx produced by the catalyst. The contribution of the catalyst to NOx production was estimated by subtracting the preburner NOx from the total measured NOx at each test point. This showed that the overall NOx emissions with fuel supplied to the catalyst and preburner were approximately the same as the levels generated by the preburner alone at the same operating conditions. The correspondence of NOx emission levels versus preburner exit temperature for the two cases is shown in Figure 4. At base load operating condition, the catalytic reactor fuel flow was approximately 80 percent of the total combustor fuel flow. The data show that the catalytic reactor produced essentially no NOx.

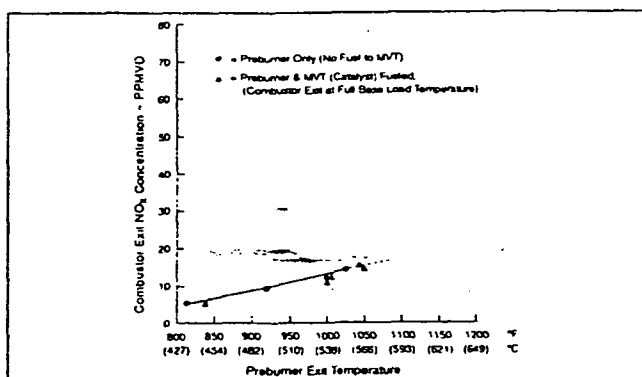


Fig. 4 Test 1, TEPCO/GE Catalytic Combustor, NOx Emissions vs Preburner Exit Temperature at Base Load Operating Conditions

CO Emissions

Carbon monoxide emissions, shown in Figure 5, are initially below 100 ppmvd during preburner only operation, then peak at approximately 3200 ppmvd when combustor exit temperature reaches 930°C during catalyst staging. Catalyst staging is a transient condition which occurs between FSNL and base load (100% rated load at turbine rotor inlet temperature of 1124°C).

During this process, combustion system temperature rise was transferred from entirely within the preburner to primarily within the catalytic reactor and post catalyst reaction zone. At the start of catalyst staging, fuel was introduced through the MVT main fuel injector and into the catalytic reactor at a low load simulation condition while combustor discharge temperature was held constant. Approximately constant combustor discharge temperature is maintained by lowering the preburner exit temperature to compensate for the additional energy released by the additional fuel introduced through the MVT main fuel injector and reacted in the catalyst and post catalyst reaction zone. At the end of catalyst staging, nearly all of the combustion system temperature rise has been transferred to the catalytic combustor. At the base load point, which occurs at a combustor exit temperature of 1196°C (1124°C machine firing temperature), approximately 80% of the total fuel is delivered to the MVT main fuel injector.

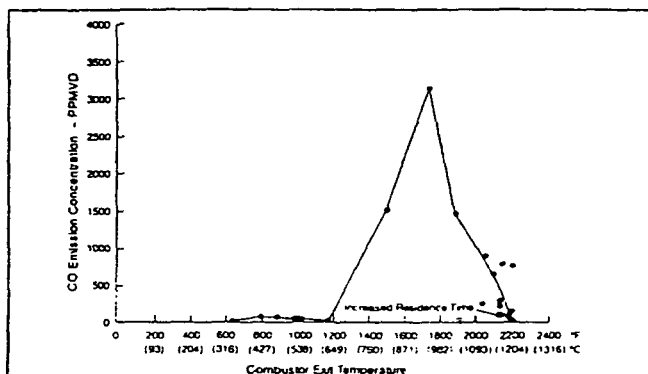


Fig. 5 Test 1, TEPCO/GE Catalytic Combustor, CO vs Combustor Exit Temperature

The 3200 ppmvd peak, shown in Figure 5, results from post catalyst reaction zone temperature being too low for complete reaction of CO in the available residence time. As the reaction zone temperature increases, CO emissions fall to a minimum value of 10 ppmvd at the base load operating condition, provided preburner exit temperature is maintained at a high enough level to keep the catalytic reactor fully active. Figure 6 shows the very sensitive effect of reactor exit temperature on CO emissions.

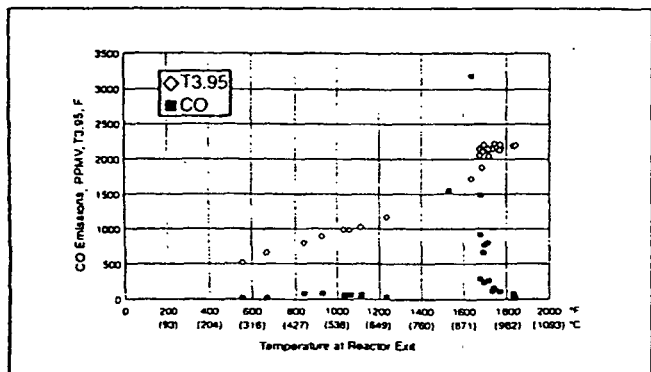


Fig. 6 Effect of Reactor Discharge Temperature on CO Emissions for 11 msec Residence Time

Figure 5 shows considerable scatter in the CO emissions levels near base load combustor operating conditions. This is due to experimentation with different preburner exit temperature levels for a given combustor exit temperature. CO and UHC emissions were found to be very sensitive to preburner exit temperature. It was necessary to maintain preburner exit temperature above 538°C in order to obtain good CO and UHC burnout at the base load operating condition.

UHC Emissions

Unburned hydrocarbon emissions are shown in Figure 7. This data exhibits two distinct peaks. The first peak occurs near 427°C and results from preburner combustion inefficiency at low temperature rise. The major peak occurs near 800°C and is the result of incomplete combustion as the preburner fuel is being reduced during catalyst staging. As more fuel is added to the MVT main fuel injector, combustor exit temperature increases and UHC emissions decrease to none at the simulated base load operating point. A data point was taken with combustor exit temperature of 1196°C and preburner exit temperature reduced to 448°C. At this point, CO rose to 731 ppmvd and UHC to 1922 ppmv. The reason for this emissions performance is that the preheat was insufficient to keep the catalytic reactor fully lit. Partial extinction of the reactor was observed in the video image and could also be detected in the combustor exit temperature distribution.

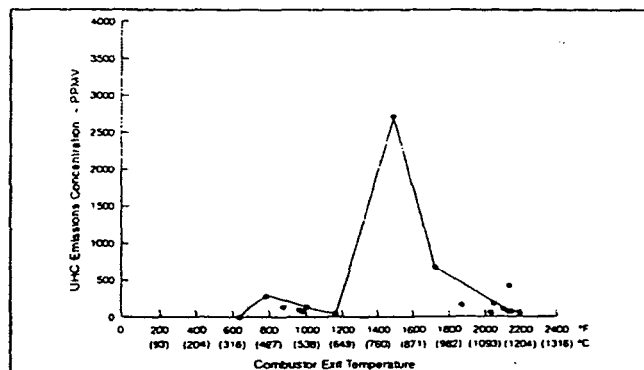


Fig. 7 Test 1, TEPCO/GE Catalytic Combustor, UHC vs Combustor Exit Temperature

At the simulated base load operating point with preburner exit temperature at 563°C, the overall conversion of fuel to equilibrium combustion products was greater than 99.99%, based on the measured CO and UHC levels at the combustor exit. On the basis of the temperatures measured at several axial stations along the test rig, the fuel conversions were approximately as follows: 23% in the preburner, 52% in the catalytic reactor and 25% in the post catalyst reaction zone. Thus, with catalytic reactor exit gas temperature (bulk average) of approximately 1000°C, the homogeneous reactions after the catalyst were responsible for burning the remaining 25% of the main fuel flow to equilibrium in a residence time of approximately 11 milliseconds.

Dynamic Pressures and Pattern Factors

Dynamic pressure activity measurements showed that the catalytic combustor system had dynamic pressures lower than production combustion systems currently being supplied with heavy-duty industrial gas turbines. The highest discrete peak had a magnitude of 0.00173 MPa, at a frequency of 252 Hz and was measured during a test point with steam injection into the preburner to determine the NO_x abatement effectiveness of steam injection into the preburner, which uses a conventional diffusion flame burning zone. The maximum overall RMS noise level of 0.00836 MPa was also measured during the preburner steam injection experiment. The steam was injected through the atomizing air passages of the preburner fuel nozzle at a mass flow rate approximately equal to the preburner fuel flow rate. Without steam injection, dynamic pressures were approximately 0.00139 MPa.

Combustor exit gas temperature distributions were measured using an array of fixed thermocouples located in the test stand nozzle box. The nozzle box is located at the downstream end of the transition piece which would be just forward of the turbine inlet on an actual machine installation. Exit gas temperature data was reduced to a pattern factor number at each fired test point. Pattern factor is the ratio of the maximum temperature variation from the mean divided by the overall combustor temperature rise.

The pattern factor goal for the catalytic combustor system was 0.10 or less at simulated base load conditions. Data at the simulated MS900IE base load operating point showed a pattern factor of 0.138. Insight into the cause of non-uniformity in the combustor exit gas temperature distribution may be gained by study of the gas temperature distribution measurements made at the catalytic reactor exit. Reactor exit hot gas temperature distribution was measured by eight type B immersion thermocouples spaced evenly on a circle about 203 mm (8 in.) from the centerline of the reactor and about 25 mm (1 in.) downstream from the exit face of the catalyst. Figure 8 shows the circumferential distribution of reactor exit temperature measured by the 8 type B thermocouples as a function of preburner temperature rise. The data for these plots were all taken at simulated base load operating conditions; and the data were normalized for plotting by dividing the local temperature measured by each thermocouple by the average value for all eight. It can be seen that the level of the highest temperature peak, which is located 300 degrees clockwise from top dead center when viewed looking aft, increases with increasing preburner temperature rise.

Figure 9 presents data on circumferential temperature distribution from the same 8 thermocouples with only the preburner fired. These data are normalized in the same manner as used for Figure 8 and presented as functions of preburner temperature rise. Some observations based on the data in Figures 8 and 9 follow:

1. The highest peak in the catalyst exit temperature distribution occurs in a region where preburner exit temperature is high.
2. The magnitude of the highest peak in catalyst exit temperature distribution increases with increasing preburner temperature rise.

3. The magnitude of preburner discharge gas temperature variation increases with increasing preburner temperature rise.

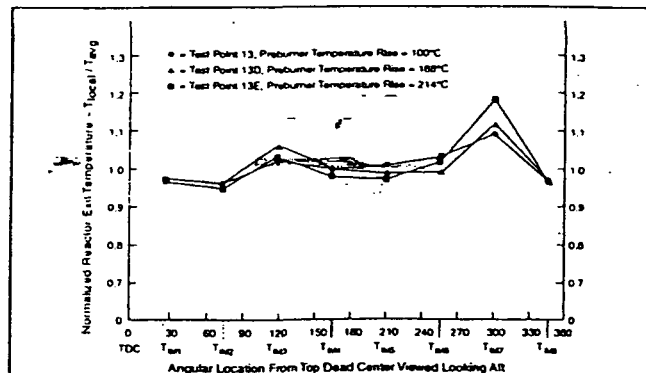


Fig. 8 Test 1, TEPCO/GE Catalytic Combustor, Normalized Reactor Exit Temperature Distribution, Base Load

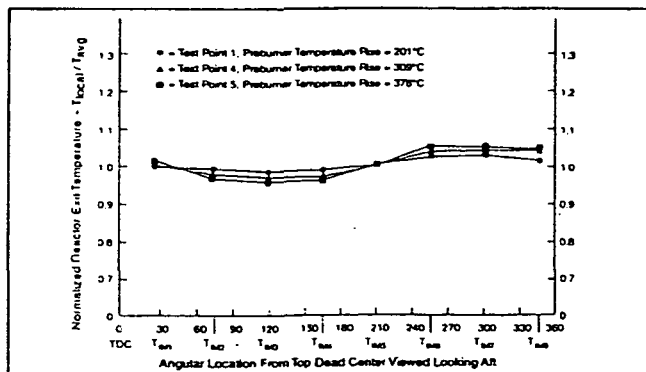


Fig. 9 Test 1, TEPCO/GE Catalytic Combustor, Normalized Reactor Exit Temperature Distribution, Preburner Only Fueled

From these data, it was inferred that preburner exit gas temperature non-uniformity was a contributing factor to catalytic reactor exit gas temperature non-uniformity. However, the observed preburner exit temperature non-uniformity was reasonably small as can be seen by the data in Figure 9 with only a range of approximately 4%, or 22°C; and so the very large spread in reactor exit temperature (refer to Figure 8) appeared to be inconsistent with the preburner distribution. This was, in fact, confirmed by a subsequent test in which a static mixer was introduced in the diffusing section of the preburner before the MVT fuel injector system. The mixer produced a slight improvement in the preburner exit temperature distribution, but resulted in a major degradation of the reactor exit temperature distribution uniformity. These data were the basis for suspecting that the non-uniform reactor exit temperature distributions were likely caused, not by preburner temperature non-uniformity, but by the non-uniformity of the fuel-air distribution inlet to the reactor face. The latter was affected negatively by non-uniformity of the hot gas mass flux distribution exiting the preburner

and entering the MVT fuel system which provides the fuel to the reactor. This predominant effect of preburner exit mass flux distribution on the reactor inlet fuel-air distribution was confirmed by the diagnostic instrumentation included in the next test, Test 2 described below.

With this as a backdrop, the relatively cool center section of the reactor seen in Figure 10 was reasoned to be due to low fuel-air ratio at the center of the reactor caused by higher than average mass flux at the center of the preburner discharge, assuming uniform fuel injection by each of the venturis in the MVT. Additional information on reactor exit temperature distribution during the test was obtained using a combustion video system developed by GE. This system monitored reactor exit surface temperature distributions in real time and uses computer image analysis to produce color plots of the temperatures from the digitized video input. Figure 10 shows an example of the reactor exit temperature distribution with the preburner and catalytic reactor fired. A non-uniform temperature distribution is evident over the cross section.

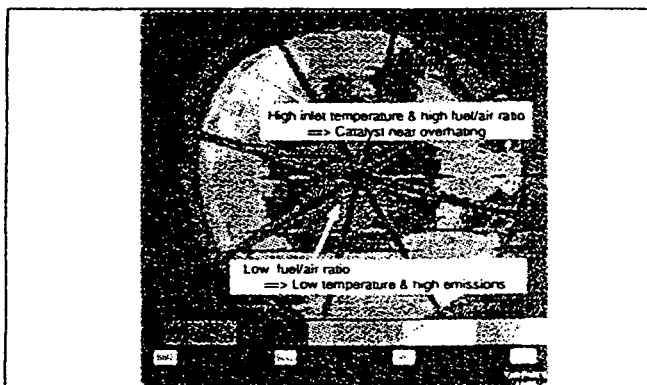


Fig. 10 Test 1, Video Image of the Reactor Exit Temperature Distribution

Any particular catalyst system is designed to have a range of conditions over which it will achieve stable operation with low emissions. This operating window is bounded by the following constraints:

1. The inlet gas temperature must be high enough to sustain the requisite catalytic activity.
2. The gas temperature leaving the catalyst must be high enough to promote homogeneous combustion and CO burnout within the available residence time.
3. The temperatures within the catalyst stages must be low enough to provide stable, long term reactor operation.

Figure 11 shows how these three factors constrain the operable combinations of inlet gas temperature and adiabatic combustion temperature (or fuel-air ratio) over which the catalytic combustor can meet the performance targets. It also shows how the inlet gas temperature and adiabatic combustion temperature interact. For example, a decrease in adiabatic combustion temperature can be compensated by an increase in inlet gas temperature to keep the operating point within the window.

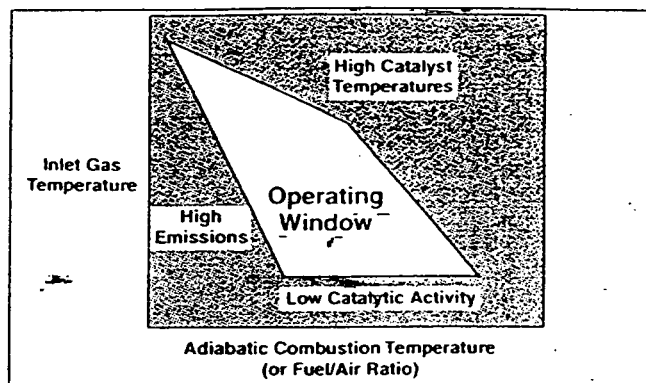


Fig. 11 Test 1, Boundaries of Catalytic Reactor Operating Window

Figure 11 indicates that, for any particular inlet gas temperature, a fuel-air ratio below the operating window results in low catalyst temperatures and high emissions of CO and UHC. On the other hand, a fuel-air ratio above the operating window causes the catalyst to overheat. If there are variations in the local temperature and fuel-air ratio across the inlet face of the reactor, some regions of the catalyst can be exposed to conditions at the "high emissions" side of the window diagram while at the same time other regions are near the "catalyst overheating" boundary. The thermal images of the reactor in operation suggest that such variations in inlet existed during the Test 1. Non-uniformities make it more difficult to assure that conditions in all portions of the reactor are within the operating window; so non-uniformities in the combustor limit the degree of flexibility in responding to the fuel-air ratios at changing load conditions.

As can be seen in Figures 5 and 6, CO emissions were very low at the base load high firing temperature points, but increased rapidly as combustor exit temperature was decreased. Although the overall solution to this CO dependence is to include air staging into the combustor design to control fuel-air ratio, which will be a part of actual turbine applications, the very narrow operating window in Test 1 has been found to be due to spatial variations across the reactor inlet face of both preburner exit temperature and, more importantly, fuel-air ratio. Figure 12 presents reactor exit gas and foil metal temperature data for test points 13D and 13E plotted against reactor inlet gas temperature. Both are base load operating points with very similar combustor discharge temperatures, but with preburner exit (thus, reactor inlet) temperatures differing by approximately 50°F (26°C). Also shown as dashed lines on Figure 12 are the maximum allowable foil wall temperature (limit set for foil endurance), the minimum outlet gas temperature required for CO/UHC emissions burnout to less than 10 ppmv, and the corresponding minimum outlet wall temperature necessary to achieve the required outlet gas temperature. For test point 13D, it can be seen that the average exit gas temperature just equals the required minimum for low CO emissions (consequently, there are regions of the reactor below the required minimum exit gas temperature), and one of the foil wall temperature TC's is in fact below the minimum wall temperature. Emissions for

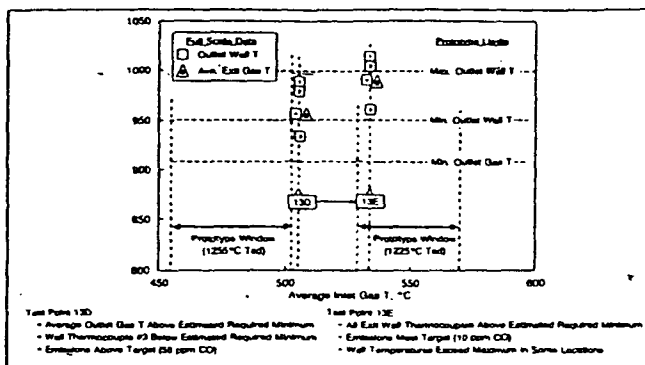


Fig. 12 Test 1, Reactor Exit Foil and Gas Temperature at Two Different Inlet Gas Temperatures

this point are shown in Table 1 below and are 58 ppmv CO and 2 ppmv UHC. When the reactor inlet temperature was increased by approximately 50°F (26°C) to reach test point 13E, the average outlet gas temperature now exceeded the required minimum by close to 75°F (40°C) indicating that the bulk of the reactor was likely now operating above this temperature and the emissions, as seen in Table 1, were reduced to 10 ppmv CO and no detectable UHC.

Table 1
Emissions at Base Load Conditions

Test Point	13D	13E	17A *
Combustor Exit T, °C	1193	1197	1194
Preburner Exit T, °C	537	563	569
Catalyst Exit T, °C	965	1003	1000
NOx, ppm @ISO, 15% O ₂	9	11	5
CO, ppm	58	10	34
UHC, ppm	2	0	1

* Steam injected at 0.21 lb/lb total fuel

MODIFIED COMBUSTOR DESIGN FOR TEST 2 - JANUARY 1996

A number of changes were incorporated into the full-scale test rig and instrumentation for the second full pressure development test of the series, Test 2, in order to improve performance and provide more diagnostic data to increase understanding of operational characteristics observed during the first full pressure test. A brief description of the changes incorporated into the test rig for Test 2 and the objectives of these changes follows:

1. The size of the post catalyst reaction zone was increased to approximately double the original length and volume. The purpose of this change was to increase post catalyst residence time in order to reduce CO and UHC emissions, improve turn-down performance, and permit operation at lower catalyst inlet temperature for lower NOx.
2. The length and volume of the catalytic reactor were increased to approximately 1.5 times the size of the original design. The purpose of this change was to accommo-

date interstage supports made of structural metal honeycombs and increase the active length/ volume of the catalytic reactor for lower emissions and increased turndown capability.

3. A perforated plate was added in the hot gas flow path near the preburner combustion liner exit plane. The purpose of this change was to obtain a more uniform velocity distribution (i.e., mass flux distribution), at the inlet to the MVT main fuel injector which is expected to result in a more uniform fuel air mixture strength distribution at the catalytic reactor inlet.
4. An array of 12 hot gas immersion thermocouples was added to the inlet face of the MVT main fuel injector. The objective of this addition was to obtain data on preburner exit temperature distribution.
5. An array of 12 hot gas immersion thermocouples was added to the catalytic reactor inlet face to obtain data on reactor inlet temperature distribution.
6. An array of 20 hot gas sample probes was added to the catalytic reactor inlet face to obtain data on fuel air mixture strength distribution at the catalytic reactor inlet.

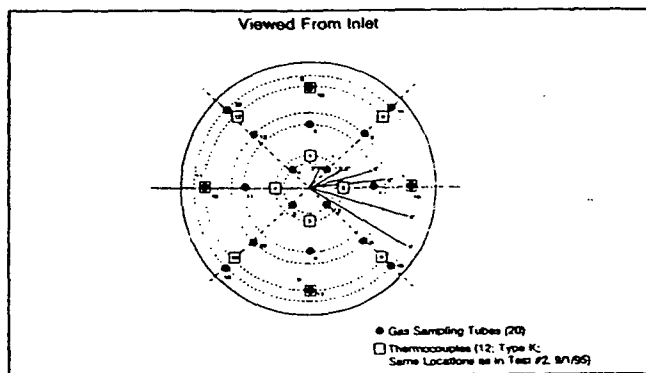


Fig. 13 Test 2, Instrumentation Locations at Reactor Inlet

TEST RESULTS AND DISCUSSION FOR TEST 2

Test 2 has been completed and the available portion of these results are presented here. A perforated plate was introduced at the discharge of the preburner, upstream of the MVT fuel injector, in an attempt to reduce the preburner exit temperature variations and, most importantly, to make the mass flux distribution exiting the preburner and entering the MVT injector more uniform, leading to an expected reduction in fuel-air ratio variations inlet to the reactor. Figure 13 shows the location of the thermocouples and gas sampling tubes at the inlet to the reactor.

Figure 14 shows the measured methane concentration measured at the reactor inlet face for the base case without a perforated plate. Figure 15 shows the measured methane concentration distribution with a perforated plate in place having a 1.5 psi pressure drop. The fuel-air ratio (or methane concentration) distribution is somewhat more uniform, but still shows areas with significantly lower fuel-air ratios, and some areas with high fuel-air. These non-uniformities will be resolved before further

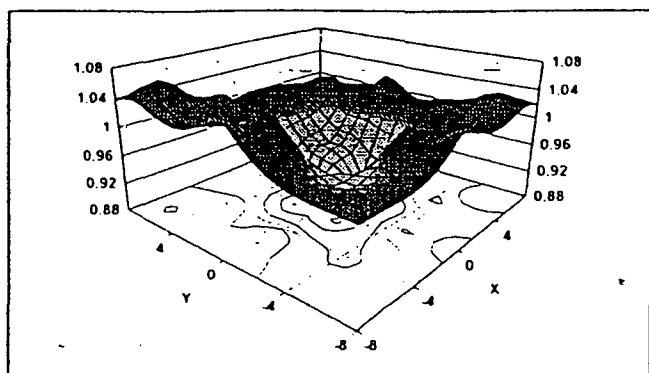


Fig. 14 Normalized Methane Concentration (without perforated plate)

combustion testing. This is necessary for truly effective reactor operation with a reasonable operating window with acceptable low CO/UHC emissions, and lower foil temperatures. The data show the significantly lower fuel-air ratios in the center third of the reactor compared with the higher fuel-air ratios in the surrounding annular two-thirds of the reactor. These data are consistent with the temperature map shown in Figure 10 which presents the reactor exit temperature distribution measured by the video system. The rapid increase in CO emissions seen in Figure 5 as the combustor discharge temperature is reduced below baseload conditions can now be understood on the basis of the reactor operating map of Figure 11 and the data of Figure 14. As can be seen from the data, a large portion of the reactor is operating with low fuel-air ratio at its inlet which will lead to lower than average exit gas temperatures and higher than average CO emissions. To achieve very low CO/UHC emissions, it was necessary to operate the reactor with a the outer portion near foil temperature limits in order to increase the exit gas temperature emanating from the center third of the reactor to a level high enough for complete CO burnout.

Table 2
Combustor Performance Data

Test 1 (March 1995) vs. Test 2 (January 1996)		
Parameter	Test 1	Test 2
T3.95 (°C)	1195	1191
Tpbexit (°C)	563	433
MCP (psig)	188	188
Tinlet CD (°C)	349	338
Air Flow (pps)	53	53
NOx @ 15% O2 (ppmv)	11	3.5
CO (ppmv)	10	82
UHC (ppmv)	0	43
Tgas reactor exit (°C)	1003	908

However, overall performance was improved over the Test 1 results discussed above. A major reduction in NOx emissions at full load operating conditions was achieved, with NOx levels

of the order of 3-5 ppmv without steam injection. These low NOx emissions resulted from being able to operate the reactor at significantly lower preburner exit temperatures. CO and UHC emissions were approximately 40 and 80 ppmv, respectively. Table 2 compares the March 1995 and January 1996 overall performance results.

SUMMARY AND CONCLUSIONS

Since 1990, GE, Catalytica and TEPCO have collaborated in the development of a catalytic combustion system for the MS9001E gas turbine, rated at 104 MWe at a turbine inlet temperature of 1105°C (E conditions). The system utilizes partial combustion of fuel in the reactor section, with completion of reactions in a post-reactor homogenous combustion zone before entering the turbine first stage nozzle. Tests at subscale (5cm - 7.6 cm diameter reactors) have demonstrated single-digit NOx, CO and UHC at E conditions.

A full-scale test of the MS9001E catalytic combustor was completed in March 1994 and reported earlier (Beebe, et. al. 1995) which demonstrated the potential for achieving program goals. After redesign and hardware fabrication, the catalytic combustor was tested again in March 1995. The results discussed in this paper show significant advances over previous full-scale tests in this program and over other reported work in the field of catalytic combustion applied to actual gas turbines. Among the major accomplishments of this latest test are the following:

1. First full-scale test to achieve full MS9001E turbine cycle conditions (1105°C Turbine Inlet Temperature).
2. Major improvement in reactor mechanical integrity as measured by minimal distortion of the 508 mm (20 in.) diameter reactor at the exit of Stage 3 after several hours of operation.
3. Less than 1 ppmvd NOx generated by the catalytic reactor, approximately 9 ppmvd NOx (ISO, 15% O2, dry) generated by the preburner. NOx was reduced to 3-5 ppmvd by the addition of a small quantity of steam (steam-to-fuel mass ratio ~0.25).

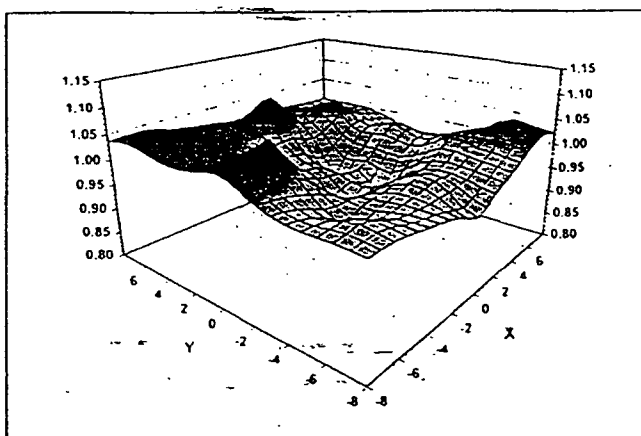


Fig. 15 Normalized Methane Concentration (with perforated plate)

4. CO and UHC emissions were significantly reduced from earlier test results (several hundred ppmv), to as low as 10 ppmv CO/0 ppmv UHC at base load conditions.
5. Stable operation of the reactor at base load flow, temperature and pressure, with very low combustion-driven dynamic pressure oscillations.

After redesign of the system, Test 2 was performed in January 1996 with a system designed to increase the post-reactor residence time, the fuel-air distribution inlet to the reactor, and the mechanical reactor support system. Initial results show improvement and have provided detailed reactor inlet fuel-air distributions which are the basis for further improvements to the fuel-air uniformity.

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completed in a post-catalyst combustor. The latter two approaches rely on keeping substrate temperatures low to prevent problems of thermal sintering and catalyst deactivation. Other gas turbine integration issues include engine start-up, acceleration, part load operation, turndown of catalyst, combustor cooling, transition to the turbine section and engine controls.

It is felt that many of the limitations of conventional catalytic combustors may be overcome through appropriate combustion system design. For example, catalyst designs that limit substrate temperatures well below the adiabatic combustion temperature may help resolve the substrate durability issue. This work presents a new system approach where start-up and part load operation of the system are accomplished using a conventional lean-premixed injector, and transition to catalytic combustion is achieved using variable geometry design. Further development and evaluation of the system is required before the technology is applied to gas turbine combustors. The catalytic combustor will then be integrated in an existing gas turbine. One option for integrating a catalytic combustor in a gas turbine

is shown in Fig. 1, where a canted multi-can catalytic system may be interchanged with a canted annular lean-premixed system.

FULL SCALE SYSTEM DESIGN

The design of the full scale catalytic combustion system was based on subscale test results. Details of the subscale work are available in a Topical Report (1996), and only a summary of the significant results are given below:

1. For all test conditions, the contribution of the catalyst to NO_x measurements was consistently less than 3 ppmv. The attainment of less than 10 ppmv (corrected to 15% O₂) CO and UHC was highly dependent on a combination of overall equivalence ratio, catalyst exit temperature and combustor residence time.

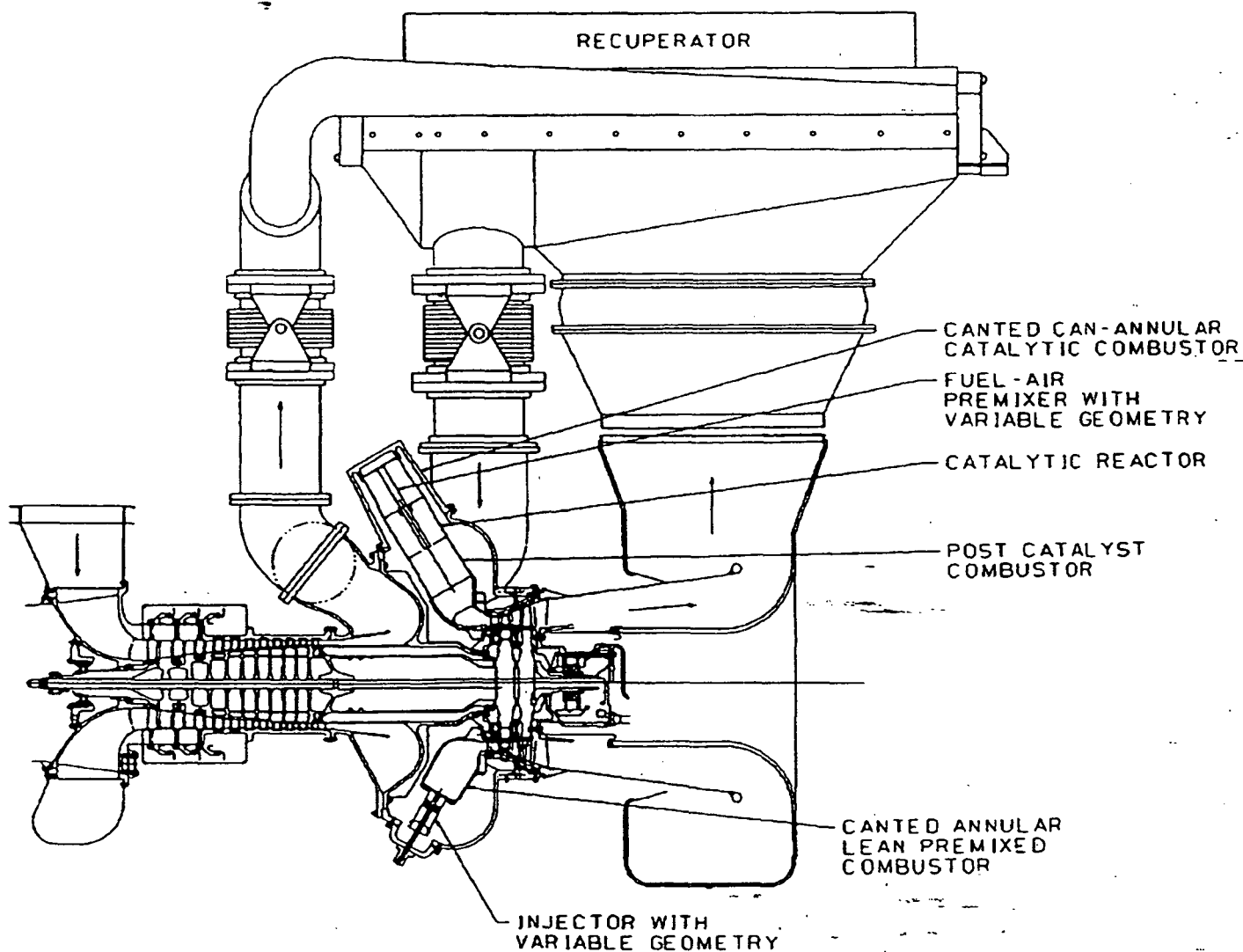


FIG. 1 - INTEGRATION OF MULTI-CAN CATALYTIC COMBUSTION SYSTEM INTO EXISTING GAS TURBINE WITH CANTED ANNULAR LEAN-PREMIXED COMBUSTION SYSTEM

2. Successful operation of the catalyst required very uniform fuel/air profiles at the inlet to the reactor. Inhomogeneities in fuel concentration ($> 10\%$ peak to peak variation) led to catalyst damage and high CO and UHC emissions.
3. Catalyst fuel/air turndown was found to be inadequate for operation of the catalyst over a wide range of engine loads. Air staging is required to maintain ultra-low CO emissions over the 50-to-100% load range (see Dutta et al., 1997).
4. In short-term testing, the catalysts showed the desired chemical activity and no observable change in performance between tests. Multiple light-off sequences were performed, and no detrimental effects on catalyst performance were observed.

The design of the single can full scale catalytic combustion system follows the catalytic and primary combustor arrangement of Cowell and Roberts (1995). Engine start-up and operation to 50% load is accomplished using a conventional lean-premixed (LP) fuel injector. At 50% load, the system transitions from LP mode of operation to catalytic mode of operation. Figure 2 shows the scheme of operation of the combustion system. A medium pressure ratio (~ 9 atmospheres) recuperated thermodynamic cycle (thermal efficiency 40%) is chosen for the ATS gas turbine. The gas turbine is operated to keep the combustor inlet temperature relatively constant between 50-and-100% load. For the present gas turbine cycle, at loads higher than 50%, the catalyst inlet temperature (recuperator exit temperature) is sufficiently high to allow catalyst ignition. This may not be the case for simple cycle gas turbines. Operation between 50-and-100% loads requires a change in the air flow distribution between the catalyst and the dilution region. This allows the catalyst outlet temperature to be kept relatively constant over the 50 to 100% load range in order to overcome limitations of narrow fuel-air turndown of the catalyst. The required combustor outlet temperature is obtained by diverting more air flow into the dilution section at lower gas turbine loads.

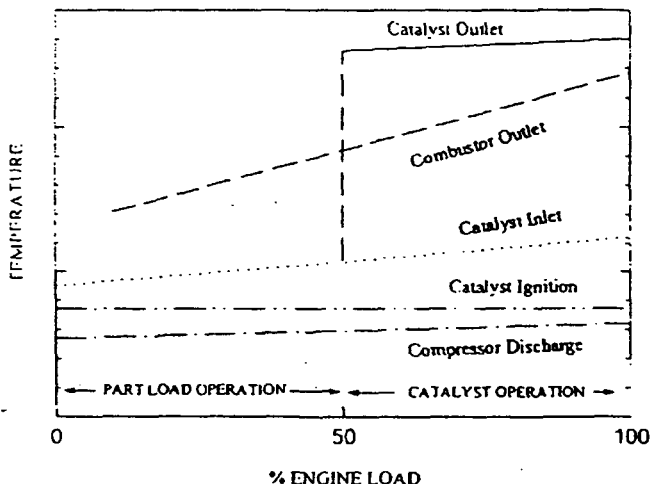


FIG. 2 - SCHEME OF OPERATION OF GAS TURBINE WITH CATALYTIC COMBUSTION SYSTEM

A schematic of the full-scale catalytic combustor is shown in Fig. 3. The system is modular in design and includes the following components: a fuel/air premixing system upstream of the catalytic reactor and a post catalyst homogeneous combustion zone, where the gas-phase reactions are

completed. The start-up (and part-load) injector is located at the center of the annular catalyst bed. The system incorporates three valves (with actuators) to control the air flow into the part-load injector, catalyst bed and dilution region. A brief description of the various components of the system is provided in the following sections.

START-UP AND PART-LOAD INJECTOR

Start-up and part load operation of the combustion system is accomplished using a lean-premixed fuel injector. The basic concept of fuel injection of such a fuel injector is shown in Fig. 4, and variations of this design have been used in various low emissions gas turbine combustor designs (Rawlins, 1995). The injector consists of a swirler and an annular premixing duct into which natural gas is injected using a number of fuel injection spokes. The injector delivers a well-mixed fuel/air mixture to the combustor primary zone. The injector incorporates a central pilot fuel flow system for light-off and to enhance flame stability at leaner fuel-air ratios at lower engine loads. The part-load injector has been designed to meet combustor air flow requirements at 50% load at the desired pressure drop.

FUEL-AIR PREMIXER

The subscale catalytic combustion work (Topical Report, 1996) illustrated the importance of delivering homogeneous fuel/air mixtures to the catalyst. A multi-venturi premixer design with multi-point fuel injection (using fuel spokes) similar to the work of Tacina (1977) was chosen. A set of annular static mixers (similar to the ones used in the subscale work) was also fabricated in order to establish a baseline premixing level for the combustion system.

The narrow catalyst fuel/air turndown necessitated the use of a variable geometry valve at the inlet to the premixer. The valve is conical in shape, and serves to change the effective flow area at the inlet to the premixer in order to modulate the air flow into the catalyst as required. An electric actuator is used to move the valve using a slider mechanism. Anti-galling material combinations (e.g., Nitronic 60 and stainless steel) were used for critical valve actuation components to reduce the possibility of failure at the elevated combustor inlet temperatures.

CATALYTIC REACTOR

Catalytic reactors similar in design to the ones tested in the subscale work were used in the present work. Details of the catalyst design have also been reported earlier (Topical Report, 1996). The full scale design incorporates an annular catalyst enclosed in an annular catalyst container, so that a part-load fuel injector can be included at the center of the combustor. The catalyst uses a FeCrAl-alloy substrate and is preferentially coated with the active compound (PdO). A combination of this design and the unique thermodynamic characteristics of the oxidation and reduction of palladium (McCarty, 1994) allows the catalyst substrate temperature to be maintained at relatively low levels ($< 1000^\circ\text{C}$). As part of the overall development program, durability testing has been carried out on subscale catalyst modules (5 cm diameter). In atmospheric pressure tests, catalyst activity was sustained for over 8000 hours (duration of the test). Durability testing at design pressure was limited to approximately 1000 hours, and no appreciable reduction in catalyst activity (as measured by the ignition temperature and emissions) was observed.

HOMOGENEOUS COMBUSTION ZONE

The post-catalyst homogeneous combustion zone is a critical component of the overall system. Partial conversion of the fuel is completed in the catalyst, and gas-phase reactions are completed in this combustor. Adequate combustor residence time is required to achieve CO concentration

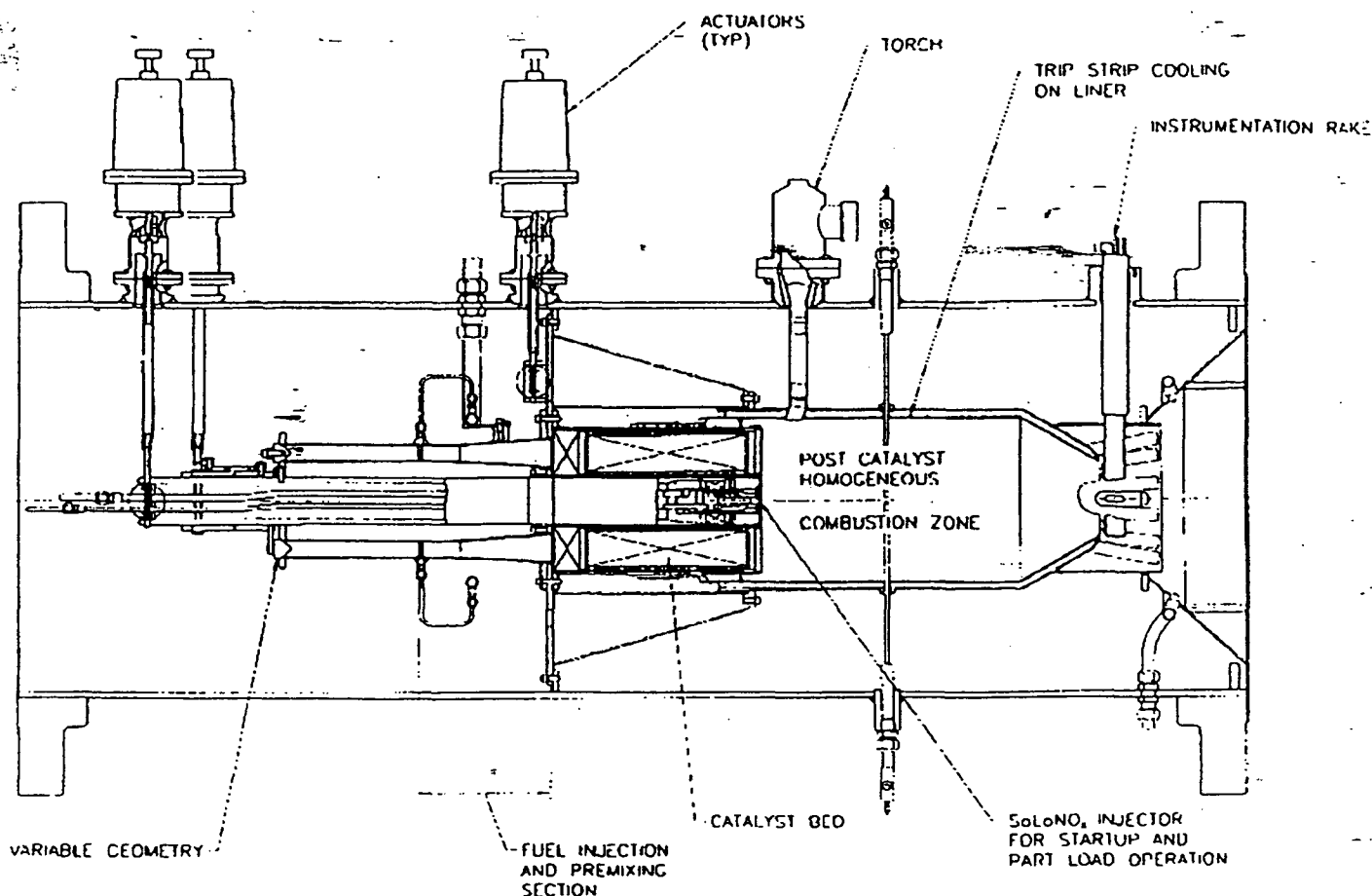


FIG. 3 - SCHEMATIC OF SINGLE-CAN FULL-SCALE CATALYTIC COMBUSTION SYSTEM

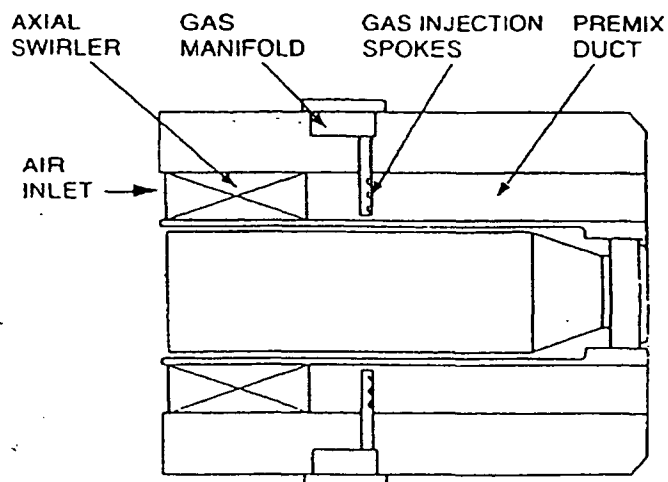


FIG. 4 - SCHEMATIC OF FUEL INJECTION IN THE PART-LOAD INJECTOR

reduction to less than 10 ppmv levels. The combustor size is determined by the overall equivalence ratio and catalyst exit temperature. In order to determine the size of the post catalyst combustor, laminar one-dimensional premixed flame calculations were performed using the PREMIX code of the CHEMKIN package (Kee et al., 1985). These calculations provide reasonable agreement with experimental measurements as seen in earlier work (e.g., Vortmeyer, 1996).

COMBUSTOR COOLING

Under catalytic combustor operating temperatures (1500 to 1650K), conventional film cooling is likely to quench "primary" zone reactions and lead to high CO emissions. The combustor used in the present work was designed with continuous round wire turbulence generators welded to the outside of the liner. The design of the turbulence generators was based on data available in the literature (Norris, 1970; Evans and Noble, 1978). These data show an average three-fold augmentation in convective heat transfer when compared with similar geometries without the turbulence generators.

INSTRUMENTATION

The test rig includes standard instrumentation to meter all air and fuel flow rates, pressure and temperature. The catalyst bed is instrumented with

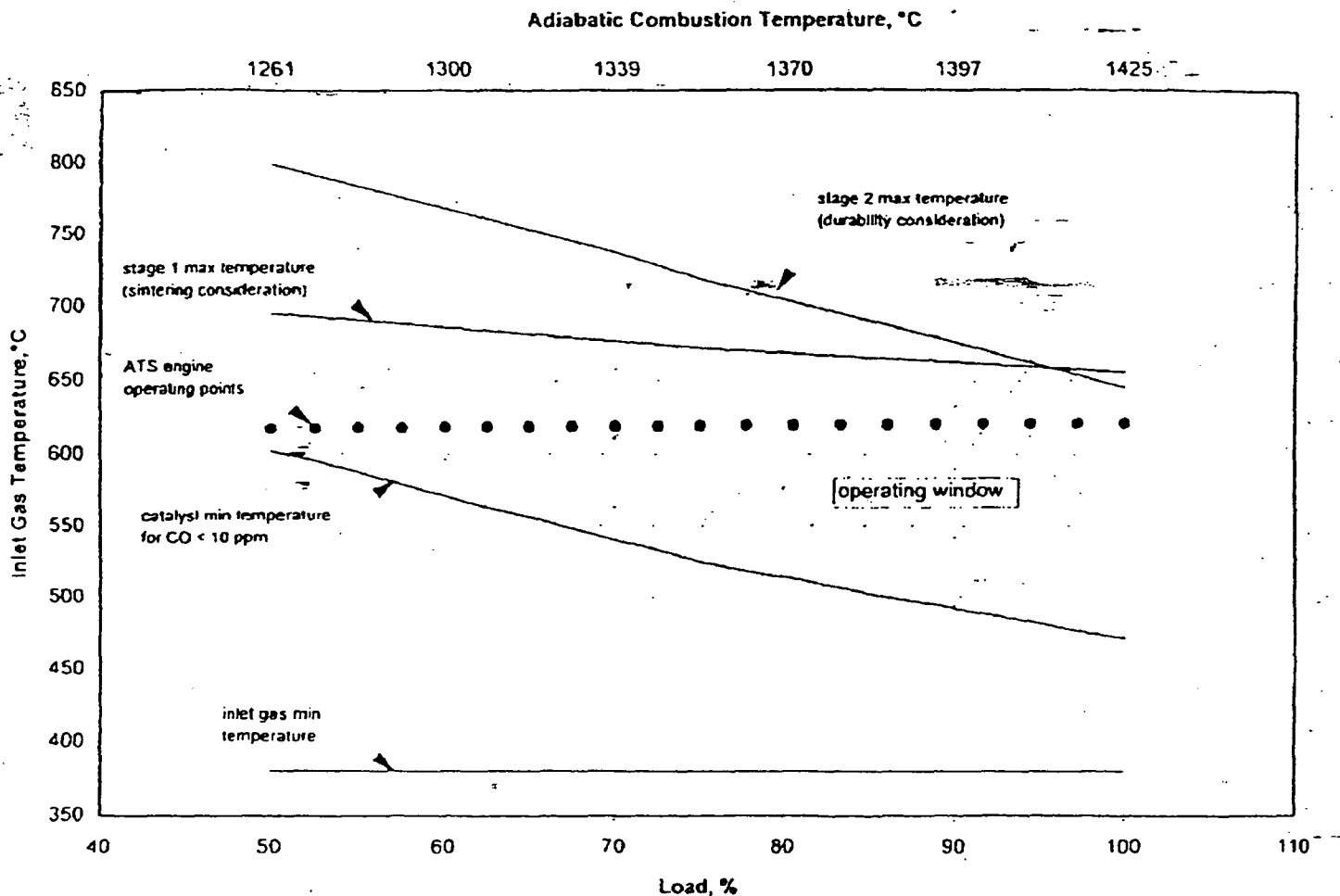


FIG. 5 - MEASURED OPERATING WINDOW OF CATALYTIC REACTOR

multiple thermocouples to obtain substrate wall temperatures and catalyst exit gas temperatures. A water-cooled sampling probe located at the exit plane of the combustor (downstream of the dilution holes) is used to obtain representative (area averaged) gas samples for analysis using standard gas analyzers. A set of six thermocouples located near the center (axially) of the combustor is used to determine the radial and circumferential uniformity of gas temperatures downstream of the catalyst, and to monitor progress of gas-phase reactions.

Similar to subscale work, a catalyst module was instrumented with multiple (~30) sampling probes in order to measure mean fuel concentrations directly upstream of the catalyst. In this test, the catalyst foil was not coated with the active species so that inadequate premixing did not lead to catalyst damage during premixing measurements.

RESULTS AND DISCUSSION

Initial work concentrated on measuring the combustor component effective flow areas as a function of valve position and establishing the desired flow distribution between the catalyst, part-load injector and dilution region at various simulated engine loads. Following these initial tests, a series of premixing measurements was conducted in order to characterize premixing levels at the catalyst inlet. Premixing levels meeting catalyst specifications (<10% peak-to-peak variation in fuel concentration) were

established through design modifications.

The catalyst was designed through subscale tests (5 cm diameter) in a high pressure test rig. The operating window of the catalyst was determined through measurements of temperature and gas concentrations in the post-catalyst region. The measured operating window is shown in Fig. 5 and demonstrates some of the advantages (such as catalyst ignition without a preburner) associated with the current engine cycle.

Catalytic combustion tests on the full scale rig were initiated by closing the central flow control valve and distributing the air flow between the catalyst and the dilution zone. Rig conditions were set to the full-load operating temperature and pressure (~865K, ~8.6 atmospheres). The catalyst was fueled to achieve the desired fuel/air ratio at full load. The rig was allowed to attain steady-state conditions before a set of data was acquired. Measurements of exhaust emissions, catalyst wall and exit gas temperatures and combustor exit temperatures were recorded. The rig operating conditions were then changed to simulate off-design engine operation down to 50% load. The inlet temperature was kept constant between 100 and 50% load. The pressure was changed to 7.5 atm., 6.9 atm., 6.4 atm. and 5.9 atm. at 80%, 70%, 60% and 50% loads respectively. At each test point (100, 80, 70, 60, 50% load), data was obtained under steady state rig operation. Emissions measurements at various test points are shown in Fig. 6. Consistent with subscale test results, NO_x emissions

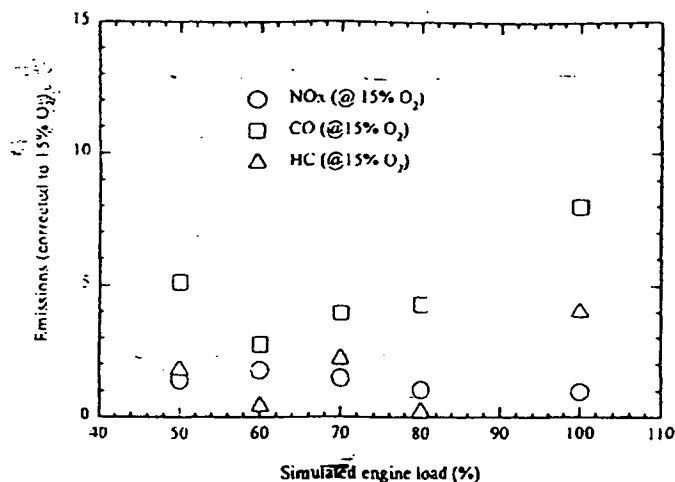


FIG. 6 - EMISSIONS MEASUREMENTS AT VARIOUS SIMULATED ENGINE LOADS

below 3 ppmv (corrected to 15% O₂) were measured at all test points. In order to meet CO and UHC emissions goals below 10 ppmv (@15% O₂), the air flow into the catalyst was modulated using the variable geometry valve.

Measurements of catalyst wall temperatures and exit gas temperatures (normalized by the mean temperatures) at 70 and 100% load are shown in Fig. 7. The catalyst wall temperatures varied from 1145K to 1210K, and were below the desired maximum temperature of 1273K. The relatively uniform temperature measurements verify the fairly homogeneous fuel-air profiles at the catalyst inlet. The effects of a well mixed gas mixture at the catalyst exit are also seen in the relatively uniform combustor exit temperatures (based on 9 thermocouple measurements) shown in Fig. 8. The combustor wall was instrumented with 5 thermocouples equally spaced in the axial direction. Preliminary measurements showed acceptable wall temperatures (<800°C) at 100% load.

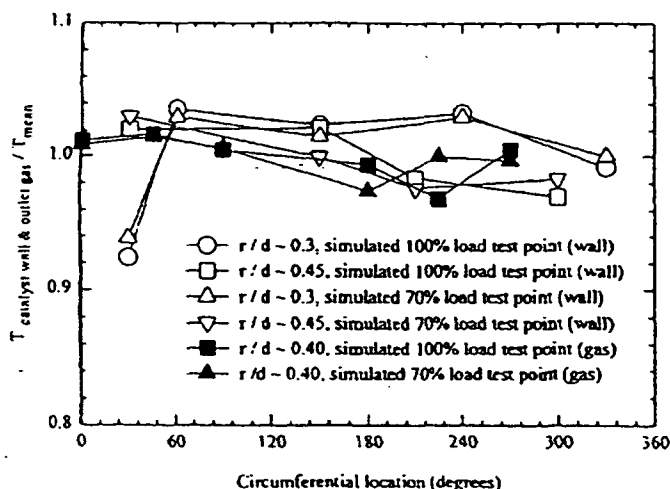


FIG. 7 - CATALYST WALL AND EXIT GAS TEMPERATURES AT TWO OPERATING POINTS

After the preliminary investigation of the system under catalytic mode of operation, the variable geometry valve was closed to divert air flow into the part load injector. Using a standard torch ignitor (shown in Fig. 3), start-

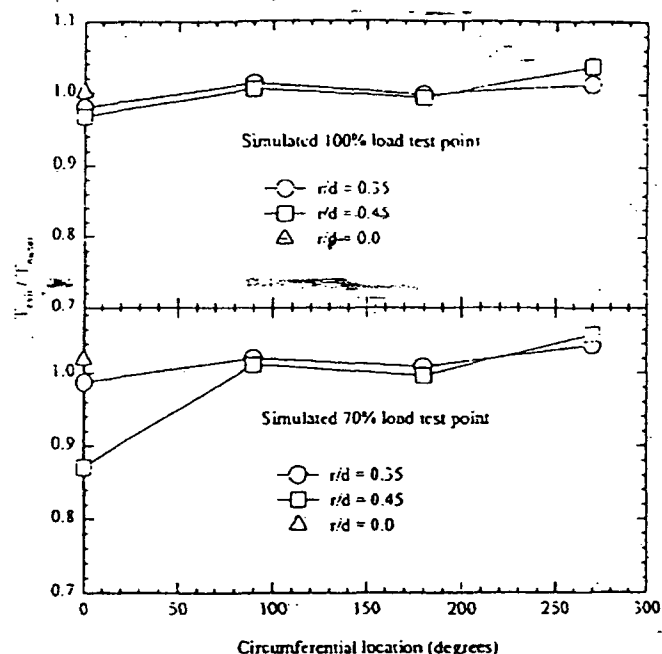


FIG. 8 - MEASUREMENT OF GAS TEMPERATURES AT THE EXIT OF COMBUSTOR

up of the part load injector was accomplished. The fuel injector was then operated under a number of part load (<50%) operating conditions. In order to evaluate the possibility of heat release in the injector premixing duct (due to autoignition or flashback) at ATS full load combustor inlet temperatures (> 620°C), a series of combustion tests was conducted with a number of similar injector designs at similar inlet temperatures in an existing high pressure single-injector test rig. Based on these tests, all the injector designs appeared to be resistant to flashback at ATS full load inlet conditions. Further investigation of this aspect will be conducted on the full scale system.

Development efforts are currently underway to allow the systematic evaluation of the following: a) transition of the system from lean premixed (LP) mode of operation to catalytic mode of operation; b) effect of air leakage on catalyst emissions; and c) effectiveness of combustor heat transfer augmentation in maintaining desired wall temperatures.

CONCLUSIONS

Preliminary testing on a single-can full-scale catalytic combustion system representative of a multi-can engine configuration has been completed. Initial test results are encouraging, and more extensive evaluation is under way to explore the viability of the concept. Preliminary tests have demonstrated the feasibility of obtaining ultra-low emissions over the 50-to-100% load range using variable geometry control. Start-up and part-load operation of the system using a lean-premixed fuel injector has been demonstrated. The catalytic combustion system incorporates several technological advances over conventional lean-premixed systems, and successful full scale testing will be a significant step towards the ultimate goal of using a catalytic combustor in a future ATS engine.

ACKNOWLEDGMENT

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APPLICATION OF CATALYTIC COMBUSTION TECHNOLOGY TO INDUSTRIAL GAS TURBINES FOR ULTRA-LOW NO_x EMISSIONS

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ABSTRACT

An operating cycle had been developed for a catalytic combustion system applied to the Allison 501-KB7 engine. This cycle used overboard bleed of diffuser air to maintain a high fuel/air ratio at the catalyst and thus achieve a high combustor outlet temperature with attendant low CO and UHC emissions. For the design point of this engine, the emissions measured at full pressure and temperature in a subscale catalyst test rig were <1 ppm NO_x and <2 ppm CO and UHC. Tests over the full operating cycle showed that the catalytic combustor system would achieve low emissions from 20 to 100% load.

The use of catalytic combustion on a high efficiency gas turbine engine design was also evaluated. Pressures up to 20 atm and combustor outlet temperatures up to 1500°C (2730°F) were demonstrated with NO_x emissions <2.2 ppm and CO and UHC <2 ppm. These results show that catalytic combustion is a viable technology for application to a high pressure, high temperature industrial gas turbine engine design.

INTRODUCTION

Substantial past and present work is directed at reducing the NO_x emissions from gas turbine engines. This objective is driven by the increasingly stringent requirements imposed by regulatory agencies in ozone nonattainment areas, by Best Available Control Technology (BACT) determinations under the Prevention of Significant Deterioration (PSD) regulations for NO_x and under the Clean Air Act legislation.

The target emissions level for NO_x is <10 ppm and in many cases <5 ppm. Current technology to meet these targets requires the use of low NO_x combustor technology plus post exhaust treatment by selective catalytic reduction. This results in high capital and operating costs. Improved low cost emissions control technology is needed.

Most of the current dry low emissions approaches for industrial gas turbine engines are based on lean premixing of fuel and air and unique ways to stabilize combustion throughout the engine operating cycle (Razdan, et al., 1994; McLeroy, et al., 1995). There is, however, a lower limit to NO_x emissions achievable with conventional methods for combustion of lean premixed fuel/air mixtures. This is due to the fact that there is a lower limit to fuel/air equivalence ratio (about 0.5 for natural gas) below which combustion becomes unstable in practical gas turbine combustors. At very low fuel/air ratios, it is impossible to practically stabilize combustion with conventional methods such as recirculation through swirlers, transverse primary jets or bluff bodies. One technology that can stabilize the combustion of ultra-lean fuel/air mixtures is catalytically stabilized combustion. A catalyst can stabilize combustion at equivalence ratios substantially below 0.5, thus limiting the maximum temperature to less than the threshold of thermal NO_x production, approximately 1550°C (2820°F).

A new staged catalytic combustion technology has been developed by Catalytica, Inc. and Tanaka Kikinzoku Kogyo and has been described in recent publications (Dalla Betta, et al., 1994). This technology is applicable to a wide range of

gas turbine designs including high pressure and high firing temperature machines.

This catalytic combustion technology has a range of desirable operating conditions where ultra low emissions are obtained. These conditions must be matched to the engine combustor operating conditions. In addition, the gas turbine must be started up and brought to conditions within the operating regime of the catalytic combustion system prior to initiation of catalyst operation by applying fuel to the catalyst inlet. Engine cycle calculations have been done for the Allison 501-KB7 industrial gas turbine engine to specify the combustor operating conditions during start up and loading of the machine. These conditions were then matched to the catalytic combustion system operating regimes and the engine cycle and combustor operation modified as required to define several possible operating cycles for the catalytic combustor equipped engine. These cycle calculations are presented and the required combustor and turbine modifications discussed. Also, the catalyst operation over the required range has been demonstrated.

CATALYTIC REACTOR DESIGN

Catalytic combustion of well premixed fuel air mixtures has been shown to produce very low emissions, typically in the range of 1 ppm NO_x. However, this technology has not been commercialized due to poor performance of the catalyst systems at the high operating temperatures required by modern high efficiency gas turbines.

In traditional catalytic combustion systems, the fuel/air mixture necessary to achieve the required combustor outlet temperature is fed to the catalyst. The diffusion controlled reaction rate on the catalyst raises the catalyst surface temperature to the combustor outlet temperature. For modern high efficiency gas turbines with turbine inlet temperatures of ~1100 to 1250°C (2010 to 2280°F), a combustor outlet temperature of 1200 to 1400°C (2200 to 2550°F) or higher is required. This would subject the catalyst to extreme abuse, causing problems such as:

- Thermal sintering of support surface area
- Thermal sintering and vaporization of active components such as noble metal
- Thermal shock fracturing of ceramic supports

In addition, this technology would be difficult to apply to the next generation of high efficiency gas turbines since the higher turbine inlet temperatures, approximately 1400-1450°C (2550-2640°F), would require further development of ceramic supports and catalysts to withstand these higher temperature conditions.

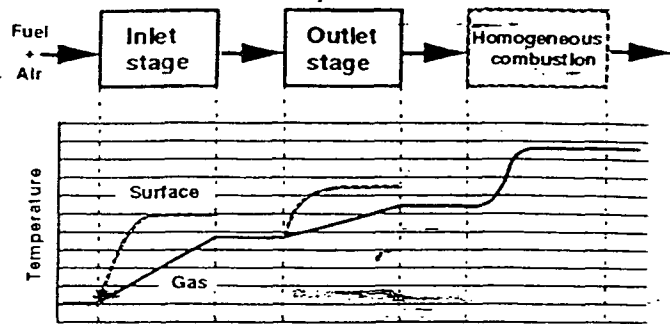


FIGURE 1 SCHEMATIC DIAGRAM OF CATALYTIC COMBUSTION SYSTEM IN WHICH THE CATALYST SUBSTRATE TEMPERATURES ARE LIMITED AND COMPLETE COMBUSTION OCCURS AFTER THE CATALYST.

A new approach to catalytic combustion is shown in the schematic of Figure 1. The full fuel air mixture to achieve the required combustor exit temperature is fed to the catalyst. Reaction on the catalyst results in a rise in the catalyst substrate temperature but the temperature rise is limited to a relatively low value. The gas temperature rises due to heat transfer from the hot catalyst substrate. Subsequent stages may be required with higher wall temperatures to achieve the required catalyst outlet gas temperatures. The partially combusted fuel air mixture then exits the catalyst and is combusted in a homogeneous gas phase reaction that causes the mixture to reach the full adiabatic combustion temperature.

Several important aspects of the system design are:

Inlet Stage

- Designed to maintain a very low wall temperature
- Low substrate temperature makes possible a stable very high catalytic activity necessary for catalyst operation at the compressor discharge temperature

Outlet Stage

- Can be designed with a higher substrate temperature to provide the required catalyst outlet gas temperature
- Lower catalyst activity is acceptable since a higher inlet gas temperature is provided by the inlet catalyst section

Homogeneous Combustion Region

- Localizes the high temperature after the catalyst
- Completes combustion of the fuel and burnout of CO and unburned hydrocarbons to the required levels
- Produces the required combustor outlet temperature

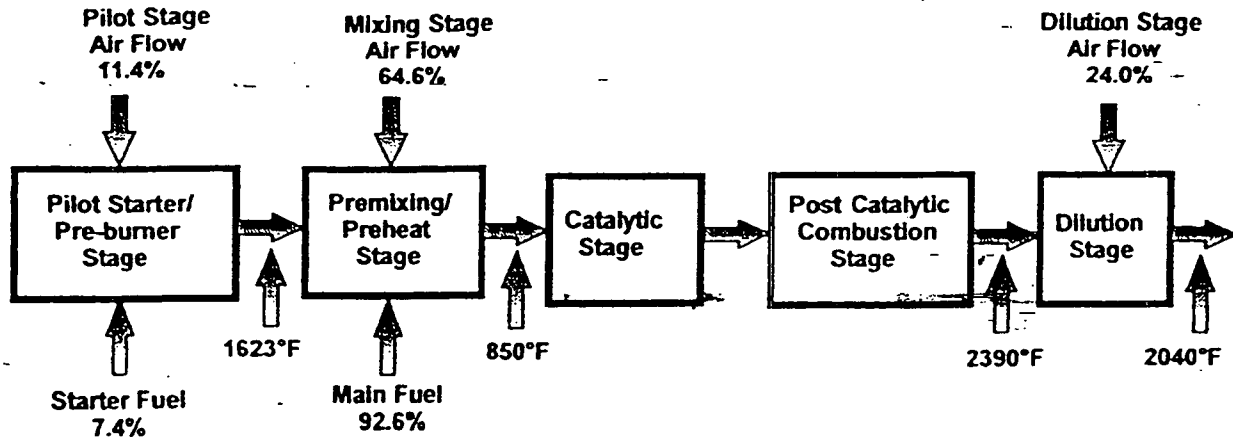


FIGURE 2 SCHEMATIC OF MULTIPLE STAGE ULTRA-LOW EMISSIONS CATALYTIC COMBUSTION SYSTEM

This system design can provide many advantages:

- Low catalyst temperatures can reduce or eliminate many of the deactivation mechanisms that could limit catalyst life
- Allows the use of a wider variety of substrate and catalyst materials
- Substantially reduces or eliminates the problems associated with thermal shock fracture of substrates during start-up, shutdown, or turbine trip type operations
- Technology can be adapted to higher combustor outlet temperatures without changes in catalyst materials

The catalytic units used in this work consisted of multistage corrugated metal supported monolithic structures that would provide a catalyst with a low pressure drop under the high gas flow during full load operation. The catalyst is a washcoat layer on the surface of the metal support, the washcoat consisting of a precious metal components and other additives on a high temperature thermally stable high surface area oxide support. Performance details and other aspects of these catalysts have been presented previously (Dalla Betta, et al., 1994b).

DESIGN OF COMBUSTOR

The combustor must operate in several stages shown schematically in Figure 2. A schematic design showing one possible configuration applied to the Allison 501-KB series engine is shown in Figure 3. This engine, a can-annular aeroderivative design, is being developed as a single external combustor configuration in a DOE/Allison sponsored program. This basic configuration will be used for the initial field testing of a catalytic combustion gas turbine engine. In Figure 3 the catalyst fuel injector system is

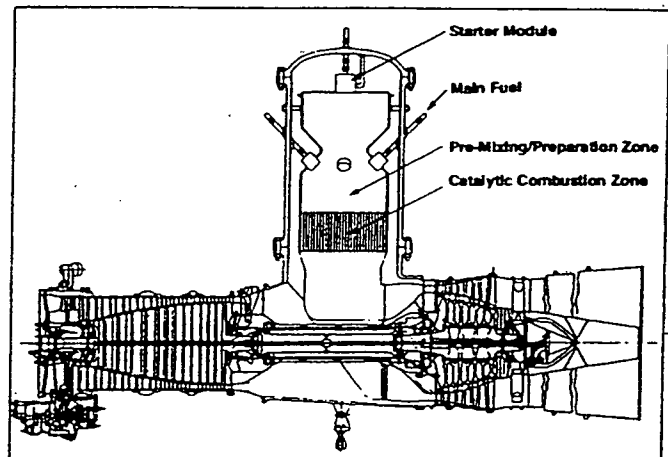


FIGURE 3 CROSS SECTION SCHEMATIC OF THE ALLISON 501-K ENGINE AND THE CATALYTIC COMBUSTION SYSTEM ARRANGEMENT

shown as a combustor liner mounted premix injectors as one possible approach. Other catalyst fuel injector system designs are being investigated (Puri, et al., 1995).

Preburner

The preburner is necessary to start the gas turbine and bring it up to full speed or part load where the air flow and compressor discharge pressure and temperature are in the required range for catalytic operation. The pilot stage can be operated in a lean/semi-premixed mode to establish stable combustion in this zone. Lean-premixed operation is desired to minimize the NO_x production. At the design point for the Allison 501-KB7 engine, about 11% of the total compressor discharge air and about 7% of the total fuel enters the pilot/preburner stage. At design point, this fuel

flow will raise the compressor discharge temperature to the level required by the catalyst for stable combustion.

Catalyst fuel injector/premixer

Figure 3 shows the catalyst fuel injector as multiple premixing modules. The design of these modules is such that the premixed fuel/air and the hot combustion products of the pilot stage mix quickly to achieve uniform preheat temperature and velocity required by the catalyst stage. Approximately 65% of the air and 93% of the fuel is introduced at this point.

Catalyst

At the catalytic stage, premixed fuel and air at a temperature of about 450°C (850°F) enter the catalyst where partial combustion of the fuel takes place. The catalyst is designed to limit the catalyst temperature to less than 1000°C (1830°F), and the gas exiting the catalyst is at a temperature in the range of 850 to 950°C (1550 to 1750°F).

Homogeneous combustion stage

The post catalyst homogeneous combustion stage is designed with the required residence time to complete the burnout of the remaining fuel and raise the gas temperature to the level required to initiate rapid homogeneous combustion. To achieve efficient homogeneous combustion in the post-catalyst zone, quenching effects at the walls that may result in high CO and UHC levels would be minimized by using a thermal barrier coated hot combustor wall design.

Dilution zone

Dilution air is added at the end of the homogeneous combustion zone to control temperature level and exit temperature pattern to the power turbine. Some of this air may be liner or transition cooling air.

COMBUSTOR OPERATING CYCLE

A thermodynamic engine cycle analysis was performed for the Allison 501-KB7 engine. The first step was to adjust the air flow and fuel flow splits in the combustor to achieve the required temperatures and fuel/air ratios at the design point. These air and fuel splits are shown in Figure 2. The air flow is split so that a total of 76% of the air is injected up stream of the catalyst. At the design point fuel flow, this would provide an adiabatic combustion temperature of 1310°C (2390°F) in the post catalyst homogeneous combustion zone which would give rapid and complete CO and UHC burnout. Next, the fuel is split between the preburner and the catalyst fuel injector so that the compressor discharge temperature is increased from 392°C to 450°C (737°F to 850°F) at the catalyst inlet. The remaining

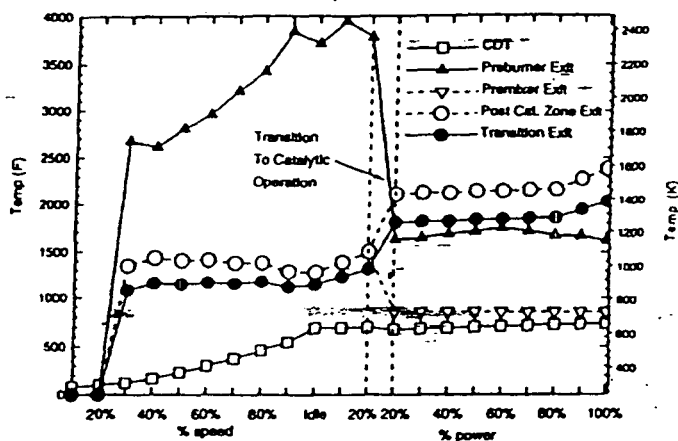


FIGURE 4 TEMPERATURE DISTRIBUTION WITHIN A CATALYTIC COMBUSTION SYSTEM AT VARIOUS POINTS OF A 501-KB7 ENGINE CYCLE

air flow, 24% of the total design point air flow, is injected after the post catalyst burnout zone and can be used for transition cooling and dilution injection.

This combination of fuel and air splits satisfies the basic catalyst system operating requirements at base load. As fuel flow is reduced to decrease load, the post catalyst homogeneous combustion zone temperature decreases. At a temperature of approximately 1150°C (2100°F) the CO burnout becomes sufficiently slow that the CO emissions will rise to unacceptable levels. To maintain low emissions, the fuel/air ratio must be maintained. Properly designed overboard air bleed or dilution area modulation can be tailored to provide nearly constant fuel/air ratio over a wide power range. A cycle using overboard air bleed was evaluated and is shown in Figures 4 and 5. This cycle includes:

- Only the preburner is fueled from start up, through idle and up to 20% power. The catalyst inlet temperature during start up is maintained below 800°C (1450°F) minimizing thermal stressing of the catalyst.
- At the 20% power point, the fuel is transitioned from the preburner to the catalyst. Simultaneously overboard air bleed is ramped up to 21% of the total compressor air flow as shown in Figure 5. The air bleed raises post catalyst homogeneous combustion zone temperature to a level that would be sufficient to fully combust CO and UHC to the required emission levels.

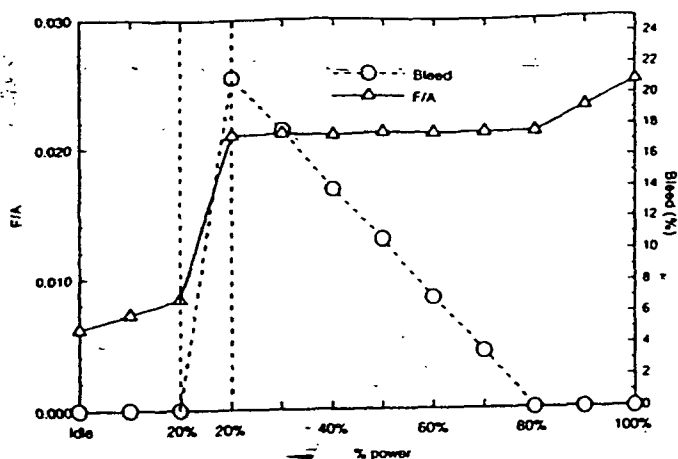


FIGURE 5 DIFFUSER AIR OVERBOARD AIR BLEED AND FUEL/AIR RATIO AT THE CATALYST INLET FROM 0 TO 100% POWER

- c. From 20% power to 80% power, the fuel is ramped up and the overboard air bleed decreased to maintain a constant fuel/air ratio at the catalyst. At 80% power, the air bleed is zero.
- d. From 80% power to full load, the fuel is increased. The post catalyst homogeneous combustion zone temperature increases from 1175 to 1310°C (2150 to 2390°F).

One negative consequence of the overboard air bleed is that efficiency is reduced as represented by increased heat release rate needed (Figure 6). As the overboard air bleed is initiated at the transition to catalyst operation, the engine efficiency decreases because the mass flow through the turbine decreases. When the air bleed is reduced at higher load, the engine efficiency approaches the base engine efficiency. This may not be a serious problem in most applications where engines run at or near maximum power where no bleed would be required. An alternative approach with no increase in heat release rate is the use of dilution area modulation. This approach is being evaluated.

PERFORMANCE OF CATALYTIC COMBUSTOR SYSTEM OVER OPERATING CYCLE

The operating cycle described above defines the pressure, air flow, fuel flow and inlet temperature for each load point from 20% to 100% load. A catalyst system was designed

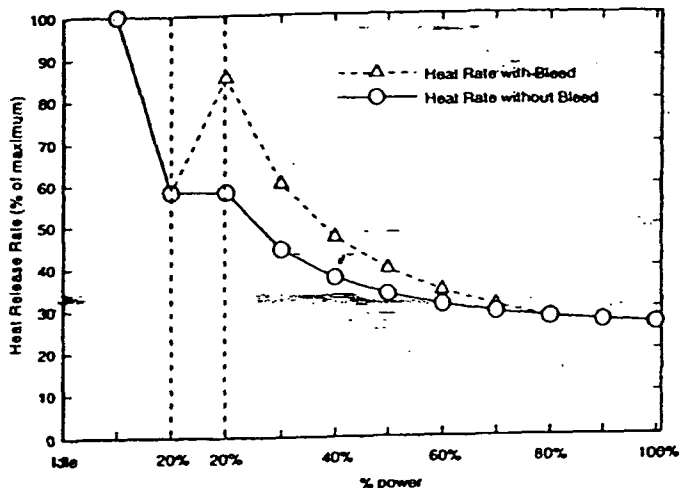


FIGURE 6 ESTIMATED HEAT RELEASE RATE WITH AND WITHOUT DIFFUSER AIR BLEED

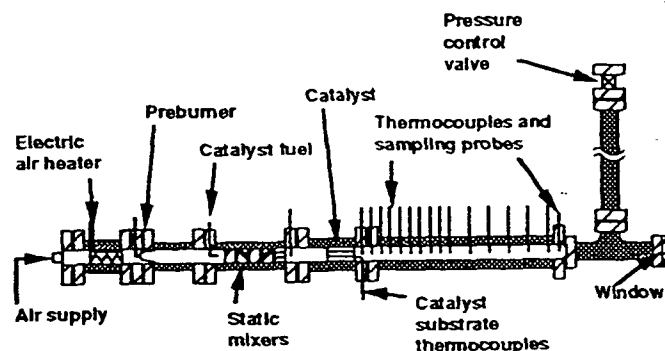


FIGURE 7 SCHEMATIC DIAGRAM OF HIGH PRESSURE TEST RIG TO EVALUATE CATALYST PERFORMANCE

for these conditions and was evaluated in the high pressure test rig at Catalytica's facilities in Mountain View, California. A schematic diagram of this facility is shown in

Figure 7. The details of this test rig have been described in detail elsewhere (Dalla Betta, et al., 1994).

This rig was used to test the catalyst performance over the operating points defined by the cycle calculations described above. The test was run as follows:

- a. The pressure and air flow were set to be consistent with the proposed operating points.

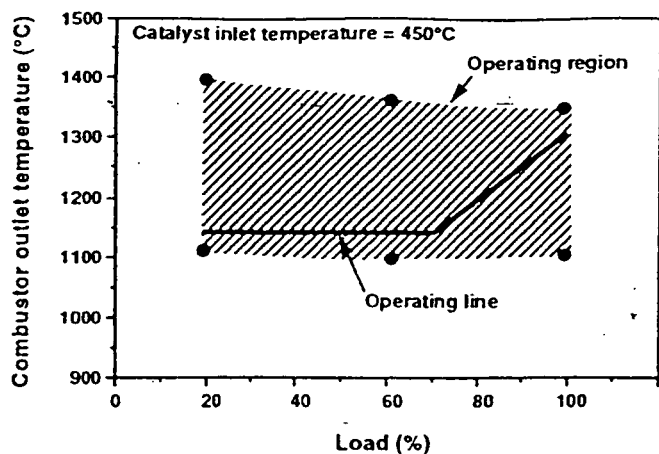


FIGURE 8 OPERATING WINDOW MEASURED FOR ALLISON 501-KB7 OPERATING CYCLE USING OVERBOARD AIR BLEED

- b. The electric preheater was set to provide an air temperature consistent with the compressor discharge temperature, and the preburner was used to raise the temperature to 450°C (840°F).
- c. Fuel was added to the catalyst fuel injector and increased until homogeneous combustion occurred in the post catalyst region. When the emissions probe showed a CO and UHC level < 10 ppm, this fuel/air ratio would establish the bottom of the catalyst operating window. The gas sampling probe was placed at a location consistent with the practical length of the post catalyst homogeneous combustion zone.
- d. The fuel was increased further until the catalyst reached its upper temperature limit. This would establish the top of the catalyst operating window.
- e. These measurements were repeated at several load points. In general, the combustor outlet temperature representing the operating window top and bottom was repeatable within $\pm 25^{\circ}\text{C}$ (45°F).

The operating window determined in this manner is shown in Figure 8. This operating window is specific for the catalyst configuration used in these tests and can be shifted somewhat by changes in the catalyst design. The operating line defined by the operating cycle described above is also shown. The proposed cycle falls within the operating window of this catalyst design over the entire simulated load range.

APPLICATION OF CATALYTIC COMBUSTION TO THE ALLISON ATS GT ENGINE DESIGN

The ATS program (Department of Energy Advanced Turbine Systems Program) for industrial gas turbine engines establishes specific goals for efficiency and emissions. The required high efficiency can be achieved by a gas turbine design operating with a high turbine inlet temperature and at high pressure. The catalytic combustion technology described above was evaluated at high pressure and high temperature to assess its range of applicability.

Typical operating conditions and performance are shown in Table 1.

TABLE 1 PERFORMANCE TEST AT POSSIBLE ATS CONDITIONS

Conditions	
Pressure	20 atm
Catalyst inlet temperature	500°C(930°F)
Catalyst inlet gas velocity	9.3 m/s
Combustor outlet temperature	1450°C(2640°F)
Performance	
Emissions (dry at 15% O ₂)	NOx ~ 1 ppm
	CO < 2 ppm
	UHC < 2 ppm

These data were collected for a catalyst designed for operation at high pressure and high combustor outlet temperature. Stable catalyst operation was obtained with very low emissions levels. NOx emissions were ~1 ppm with CO and UHC below ~2 ppm at a pressure of 20 atm and a combustor outlet temperature of 1450°C (2640°F). NOx emissions were measured over a range of pressures and temperatures and the data are presented in Figure 9.

It should be noted that at temperatures in the range of 1500°C (2730°F), the NOx emissions are only 2.2 ppm (dry, corrected to 15% O₂). This is substantially below the levels demonstrated for lean premixed systems. In addition, the NOx level is independent of pressure over the pressure range of 12 to 20 atm. This is expected for this system where the NOx is formed in the homogeneous combustion process downstream of the catalyst. These data suggest that NOx production at even higher pressures would be in the same range, that is, less than 2.2 ppm for combustor outlet temperatures of 1500°C (2730°F) or less.

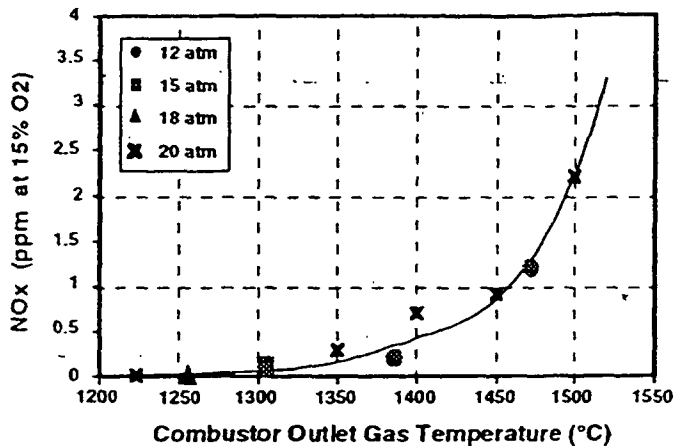


FIGURE 9 NO_x EMISSIONS FROM A CATALYTIC COMBUSTION SYSTEM PRESSURES FROM 12 TO 20 ATM AND AT COMBUSTOR OUTLET TEMPERATURES FROM 1200 TO 1500°C (2190 TO 2730°F).

The measured NO_x emissions are below the theoretical NO_x emissions for the fully premixed fuel/air mixture that is fed to this combustor. The total observed NO_x is generated in the radical reaction process occurring in the homogeneous combustion zone after the catalyst. Since a portion of the fuel is combusted in the catalyst, the radical pool is substantially more dilute resulting in a lower NO_x formation. This is consistent with the results reported for partially catalytically reacted well premixed systems (Schlegel, 1993).

SUMMARY/CONCLUSIONS

Cycle calculations for an Allison 501-KB7 engine show that a catalytic combustion system can be applied to this engine and can be operated from 20% to 100% load using overboard air bleed to maintain the fuel/air ratio over the catalyst. Subscale tests at the calculated cycle conditions for this engine show that the emissions would be <1 ppm NO_x and <2 ppm CO and UHC. Higher operating pressures and combustor outlet temperatures were also evaluated for high efficiency machines that would be applicable to the DOE Advanced Turbine Systems program (ATS). Tests were done at pressures up to 20 atm and combustor outlet temperatures of 1500°C (2730°F). Stable catalyst operation was obtained and measured emissions were very low. At 1500°C (2730°F) the NO_x emissions were ~2.2 ppm and CO and UHC were < 2 ppm.

ACKNOWLEDGMENTS

The support of the Department of Energy for the ATS Phase II work is gratefully acknowledged. Ms. Diane Hooie is the Contracting Officer Representative.

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CATALYTICA OVERVIEW

CATALYTICA, INC.

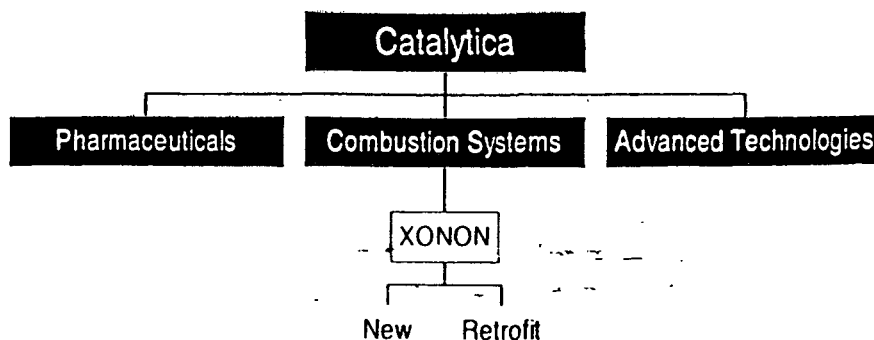
Catalytica, Inc. (NASDAQ: CTAL) builds businesses in high growth industries where the Company's technologies optimize manufacturing and solve environmental problems. In addition to Catalytica Combustion Systems, Inc., Catalytica Pharmaceuticals, Inc. provides drug development and product manufacturing to the pharmaceutical industry and Catalytica Advanced Technologies, Inc. serves as an incubator for new catalytic technologies for industrial applications. Catalytica has a market capitalization of about \$800 million and 1,400 employees.

Find Catalytica on the worldwide web at: www.catalytica-inc.com

CATALYTICA COMBUSTION SYSTEMS, INC.

Catalytica Combustion Systems (CCSI) develops and manufactures advanced combustion systems for gas turbines, based upon the breakthrough technology called XONON™ (pronounced Zo-non). The XONON Combustion System reduces NOx emissions from gas turbines to less than 3 ppm and offers the most economic and efficient alter-native to reduce emissions without impacting turbine performance.

The first commercial installation of a gas turbine with XONON has begun at Silicon Valley Power in Santa Clara, California. Performance results will be reported periodically on the Caltaytica webpage.



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XONON

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XONON™ COMMERCIALIZATION STATUS

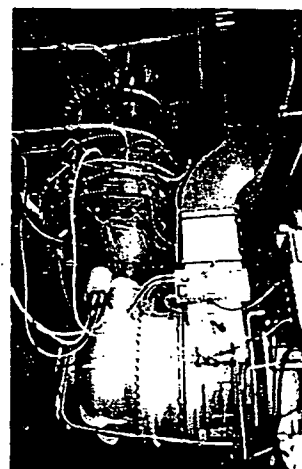
BASILINE PERFORMANCE RESULTS

A prototype of the XONON Combustion System (XONON-1) was operated in a test cell at Tulsa, Oklahoma, to establish baseline conditions. At Tulsa, over 1100 operating hours and 220 starts, XONON was proven to reduce NOx to less than 3 ppm and CO and UHC to less than 10 ppm without affecting engine performance.

SILICON VALLEY POWER PLAN

As the next step in commercialization, XONON-1 was installed on the power grid at a municipally owned electric utility— Silicon Valley Power in Santa Clara, CA – and operations began in the 4th quarter of 1998. The plan:

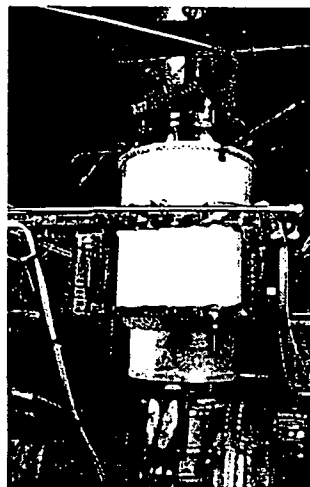
- ♦ Re-establish baseline conditions at this site and set-up for continuous operation.
- ♦ Install XONON-2, the beta version of a commercial combustor.
- ♦ Operate for 8,000 hours.
- ♦ Obtain further evidence of reliability, durability and maintainability.



XONON-1 installed at
Silicon Valley Power

UPDATES

After setting up for continuous operation and completing the air permit compliance testing in the 1st quarter of 1999, XONON-2 was installed, and performance was re-validated, again achieving less than 3 ppm NOx and less than 10 ppm CO and UHC.



XONON-2 installed
with test instruments

This combustor has been instrumented to monitor operating conditions and to obtain additional data on reliability, durability and maintainability beginning in the 2nd quarter of 1999.

This operating data is being used for the commercial application of XONON for the Kawasaki turbine and other gas turbines.

We will report actual performance results periodically on our web page at:

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GLOBAL CLIMATE CHANGE

Global climate change or global warming is one of the major environmental issues. World leaders met in Kyoto, Japan in December 1997 and developed an international approach to address this international concern.

THE PRIMARY CONCERN—CO₂

The theory is that certain gases in the atmosphere (greenhouse gases) reduce the amount of heat that the earth radiates into space. The concentration of these gases is thought to impact the surface temperature of the earth, causing adverse environmental consequences including flooding of lowlands, changes in weather patterns and long-term famines.

Of these gases, carbon dioxide (CO₂) is the primary concern. This gas is produced by the combustion of fuel that contains carbon, and it is absorbed into plants in a process called photosynthesis. The carbon absorbed as CO₂ forms the new plant structure such as wood in trees, while the oxygen (O₂) is returned to the atmosphere.

Most energy to power our industrialized society today comes from fuels that originated as plant matter, and when these are burned, the carbon is again oxidized into CO₂. As a result of the increased use of energy in recent years, the CO₂ content of the atmosphere has been increasing at an accelerating rate.

CONTRIBUTORS OF CO₂

Some fuels, such as coal, derive most of their energy from the carbon in the fuel (coal is primarily carbon), while others, such as natural gas, derive only a portion of their energy from the carbon. In natural gas, most of the energy comes from the combustion of the hydrogen, which forms water when it burns.

When burned, natural gas produces only 59% as much CO₂ as coal and 80% as much CO₂ as oil.

REDUCING CO₂

The primary tools to reduce the concentration of CO₂—the primary greenhouse gas—are:

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REDUCING CO₂ (Continued)

- ♦ Stop the clearing of rain forests
- ♦ Increase the forestation of the earth
- ♦ Reduce energy consumption
- ♦ Switch fuels to those that produce less CO₂ (e.g. natural gas)
- ♦ Use more renewable energy sources which do not change the net CO₂

And two of the best ways to reduce energy consumption are to use more:

- ♦ Gas turbine cogeneration
- ♦ Very efficient gas turbine combined-cycle power generation

Both of these power generation technologies usually burn natural gas fuel. If a power generation company, or a company that uses a lot of heat and power, replaces a coal (or oil) burning system with a gas turbine system, there would be two impacts on CO₂ reduction. The first impact would be the increase in efficiency—burning of less fuel. The second impact is that the fuel would decrease the CO₂ per unit of heat produced.

AN ENABLING TECHNOLOGY

The XONON™ Combustion System is an enabling technology in that it allows power generation companies and industrial power generators to permit natural gas burning gas turbines to replace less efficient coal or oil burning systems. The change in fuel and the increase in efficiency serve to reduce CO₂ emissions. XONON is the most cost effective air pollution control system available for industrial gas turbine engines: NO_x less than 3 ppm with carbon monoxide (CO) and unburned hydrocarbons (UHC) less than 10 ppm.

TECHNOLOGY OPTIONS FOR NEW LAER/BACT REQUIREMENTS

THE NEW REQUIREMENTS

Current U.S. air regulations for new gas turbines are resulting in permits in the range of 3 to 25 parts per million (ppm) NO_x for both LAER and BACT requirements. Recent actions by the EPA and state regulators in several areas of the U.S. indicate that required NO_x levels are moving to the lower end of this range.

As air emission requirements tighten, new technologies will be required to meet them.

NO_x CONTROL OPTIONS

There are two approaches to meeting the new LAER and BACT requirements of less than 5 ppm NO_x—one is to prevent NO_x formation, and the other is to clean it up in the exhaust. A pollution prevention technology, such as XONON™ Technology, is preferred because it minimizes production of NO_x within the combustor itself. Clean-up systems—selective catalytic reduction and SCONOX—are large, expensive units added to the gas turbine exhaust to remove already produced pollutants.

FEATURE	POLLUTION CLEAN-UP		POLLUTION PREVENTION
	LPM + SCR	LPM + SCONOX	XONON
Emissions (ppm)	< 3	< 3	< 3
Environmental / Safety Impacts	Many	Some	None
Application Limitations	Some	Many	None
Cost Impact	High	Highest	Low
Proven in Practice	Yes	In process	In process

- ♦ Selective catalytic reduction (SCR) is a pollution clean-up technology that is applied to gas turbines that already incorporate a lean-premix (LPM)¹ combustion system. SCRs have been used successfully with gas turbines for years. However, they do cause many adverse environmental impacts.

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¹ LPM alone reduces NO_x levels to 15 to 25 ppm.

SCRs use ammonia, a toxic and hazardous substance that requires special handling and permitting and results in ammonia slip (a toxic emission). The SCR catalyst contains toxic metals that must be disposed of as a hazardous waste. In addition, the high costs of SCR units have made new projects less feasible, and applications are limited to gas turbines operating within specific temperature ranges.

- ◆ **SCONOX**, a newer clean-up technology, also incorporates LPM and seems to have overcome some of the adverse environmental impacts of SCR since it doesn't use ammonia. At this time, however, information on SCONOX is limited. Environmental and safety impacts need to be clarified, and application limitations must be addressed—SCONOX can only be applied to gas fuel units with heat-recovery systems.
- ◆ **The XONON Combustion System** is a pollution prevention technology proven to achieve less than 3 ppm NO_x without producing any adverse environmental impacts. It eliminates the need for an SCR or other expensive clean-up system since it combusts natural gas at temperatures below that which NO_x can form without impacting turbine performance. Recent results from a test of XONON on a Kawasaki gas turbine engine have proven to be less than 3 ppm over a wide range of field conditions. Other full-scale demonstrations have also been conducted with GE and as part of the Advanced Technology System program (Solar Turbines and Allison Engine Company).

SUPPORTING NEW TECHNOLOGY

New technologies, such as XONON, continue to be proven in practice and offer significant reductions in NO_x emissions. The better economics of XONON can also facilitate the financing of new power plants to replace older plants that are environmentally harmful and produce substantially higher levels of air emissions.

Air emission regulators can play a big part in the process of establishing new technologies. By working with users and manufacturers, regulators can support short-term field trials required to adapt new technologies to different turbines.

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REGULATORY TRENDS

Today, U.S. gas turbine emission regulations require new installations to meet NOx emission levels of 3 to 25 parts per million (ppm) depending on location, attainment status and size of the installation. The general trend is toward the lower end of this range with permits in non-attainment areas requiring single digit NOx levels for all new permits.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

In the 1970s, the EPA established allowable ambient concentrations of criteria pollutants including nitrogen oxides (NOx), particulate matter (PM) and ozone. While all areas in the U.S. have attained compliance with the NOx standard, most of the population today lives in areas that are not in compliance with the ozone or PM standards. NOx, which is the primary pollutant of concern from gas turbines, is involved in the formation of both ozone and PM.

The standards for PM and ozone were revised in June 1997. A new PM 2.5 standard has been established and will target NOx emissions as the primary precursor. This standard will have significant impact on sources of NOx, and thus gas turbines, beginning 2005.

The impact from the changes to the ozone standard will be in 2003. These changes have more than tripled the number of counties that will be non-attainment for ozone; since NOx is a precursor to ozone, gas turbines will be impacted. The impact will be in the form of Lowest Achievable Emission Rate (LAER) determinations and rules developed at the state and district level.

NOx SIP CALL

The Clean Air Act Amendments (CAAA) passed by congress in 1990 designated all or portions of 12 northeastern states as the Ozone Transport Corridor (OTC). Ozone-transport is the case when emissions from one area drift downwind, and when combined with the local emissions of ozone precursors, may contribute significantly to the ozone concentrations in the downwind area. In several locations, it is alleged that transport from areas that are in attainment for ozone are causing downwind areas to exceed the ozone standard.

In September 1998, the EPA issued the NOx SIP Call which requires 22 Eastern states and the District of Columbia to revise their state implementation plans (SIP) to achieve additional reductions in NOx. They indicate that these reductions will allow the OTC states to achieve ozone attainment. The only target is NOx, and it stands to

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reason that some or most states will target gas turbines as one of the potential sources for reduction.

INDUSTRIAL COMBUSTION COORDINATED RULEMAKING (ICCR)

The CAAA of 1990 included a major revision to its Title III for controlling the emissions of airborne toxic substances. This new program identified 189 toxic substances, called hazardous air pollutants (HAPs), that are to be controlled. The legislation directed the EPA to identify a list of *source categories* for HAPs. To the surprise of many, gas turbines were identified as a *source category*. This means that the EPA must develop standards for the Maximum Achievable Control Technology (MACT) for the control of HAPs from gas turbines.

The Industrial Combustion Coordinated Rulemaking (ICCR) advisory committee was established to provide direction and recommendations for the standards. The ICCR was also chartered to review and update the gas turbine New Source Performance Standard (NSPS), which limits the emissions of criteria pollutants (primarily NOx, not HAPs) from any new gas turbine. Since its promulgation in 1979, the limit has been 75 ppm for utility turbines, and 150 ppm for all other units. While work has not started yet on the NSPS, this level will probably be reduced to 25 ppm or less. The ICCR was disbanded in September '98, and the EPA staff is now charged with completion of the gas turbine MACT and NSPS revisions.

TECHNOLOGY FORCING REGULATIONS

In the last 25 years, the EPA was treating the New Source Review (NSR) rule and its Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) provisions as a technology forcing measure. This mechanism has been responsible for the introduction of many new emission control technologies including gas turbine emission controls.

Recently, the trend has changed. Continually pushing lower levels without concern for economic impact stifles the replacement of older higher-polluting systems with newer cleaner technologies. The new direction is towards incentive-based regulations instead of command and control programs. The SO₂ allowances under the Acid Rain Program or RECLAIM in the Los Angeles Basin are examples of incentive-based programs that have worked quite well. Most new programs are headed in this direction.

THE XONON™ COMBUSTION SYSTEM IMPACT ON HAZARDOUS AIR POLLUTANTS (HAPS)

Title III of the Clean Air Act Amendments of 1990 (CAAA) identified 189 toxic substances as hazardous air pollutants. Acute and chronic exposure to HAPs can lead to increased health risks such as cancer. The CAAA directed the EPA to identify the source categories for HAPs and gas turbines were identified as a source category.

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XONON'S HAPS ADVANTAGE

The XONON Combustion System offers a technology that can significantly reduce organic HAPs emissions from gas turbines. This is achieved by eliminating conditions where organic HAPs typically form.

- ♦ The XONON combustor operates with a very uniform fuel-air mixture. This in turn significantly reduces HAPs such as benzene, toluene and polyaromatic hydrocarbons that are produced from by-product chemistry in fuel-rich zones.
- ♦ The XONON combustor also operates under conditions leaner than conventional combustors, which reduces the amount of quenching required to achieve the desired turbine inlet temperature. By reducing the degree of quenching, less HAPs, such as acetaldehyde, formaldehyde and acrolein form.

HAPS EMISSIONS TESTING

In most states, the application for an "Authorization to Construct" for a gas turbine must include an analysis of the impact on health risk from any HAPs anticipated from the turbine. Since XONON was expected to have HAPs concentrations lower than all conventional combustion systems, Catalytica Combustion Systems, Inc. (CCSI) conducted a HAPs emission study to confirm this expectation. CCSI used the following testing methodology to conduct the HAPs emissions test:

- ♦ Test methods were selected from the California Air Resources Board (CARB) database for gas turbine toxic emission tests (performed under the AB2588 Air Toxic Hot Spots program) to assure that the sampling and analytical procedures were sufficiently sensitive to detect levels found in prior toxic emission testing.
- ♦ Test samples were taken from the CCSI test rig.

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- ♦ A qualified laboratory using standard analysis procedures analyzed the results.

RESULTS

The organic HAPs emissions measured from the XONON combustor were significantly lower than emissions compared to gas turbine data from the CARB database. In fact, the results were "non-detects" for all organic HAPs except formaldehyde, which were more than ten times better than that of gas turbines listed in the CARB database.

Additionally, Catalytica performed a health risk assessment (HRA) comparing the test results with organic HAPs levels from the CARB database. The HRA was performed using a protocol developed by the California Air Pollution Control Officers Association (CAPCOA). This analysis concluded that the incremental health risk from a gas turbine using the XONON Combustion System is more than ten times better than that of similar turbines listed in the CARB database without XONON.

Reducing CO₂ with Natural Gas-Fired Turbines

COAL—THE MAIN PRODUCER OF CO₂

The Kyoto Summit called for a reduction of CO₂ emissions to 7% below 1990 levels by the year 2012. CO₂ is produced by the combustion of fossil fuels that contain carbon. Because coal derives most of its energy from carbon, it is a primary producer of CO₂.

NATURAL GAS—AN ALTERNATIVE TO COAL

As an alternative to burning coal, natural gas-fired turbines offer an excellent opportunity for reducing CO₂.

- ♦ Natural gas-fired turbines produced approximately 8% of the kilowatt-hours of electricity generated in the United States in 1996.
- ♦ The U.S. Department of Energy has projected that natural gas-fired turbines could produce more than half of the world's power within the next 20 years.¹

KYOTO ACCORD COMPLIANCE OPTIONS

If conversion of coal plants to natural gas were the only action taken to comply with the Kyoto accord, the following table shows how high efficiency gas turbine systems would dramatically reduce the percentage of coal plants that would have to be converted:

Compliance Options		Coal Plant Conversion Needed
From	To	
Coal Steam Plant	Natural Gas Steam Plant	45%
Coal Steam Plant	Gas Turbine Combined Cycle	28%
Coal Steam Plant	Gas Turbine Cogeneration	26%

SUPPORTING NATURAL GAS-FIRED TURBINES

Within the increasingly stringent regulatory environment, an important new technology has emerged to accelerate the trend toward the efficient use of natural gas-fueled turbines.

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¹ (<http://www.doe.gov>, Natural Gas Research, South Carolina Energy R&D Center, Page 2).

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CCSI's breakthrough XONON™ Combustion System is the first technology to virtually eliminate emissions of oxides of nitrogen (NOx) to less than 3 parts per million. It provides both environmental and economic benefits to both gas turbine manufacturers and power generators since it expedites permitting, eliminates expensive exhaust clean-up systems, has no impact on operating performance and avoids adverse environmental impacts.

OPERATIONS OVERVIEW

POWER OUTPUT ♦ STARTING/SHUTDOWN ♦ LOADING/UNLOADING

POWER OUTPUT AND HEAT RATE

Maintaining engine efficiency and power output are two important requirements for any new gas turbine technology. The XONON™ Combustion System can meet these requirements by achieving the desired turbine inlet temperature profile and by minimizing the total pressure drop.

The XONON Combustion System is designed to fully combust fuel to produce a high temperature mixture, typically over 2400°F. Dilution air is then added and properly adjusted to shape the temperature into the profile required at the turbine inlet.

In addition, the XONON module and combustor include low-pressure drop preburners and fuel mixing systems to ensure minimal pressure loss.

In operational tests on a Kawasaki M1A-13A engine with XONON, it was demonstrated that the turbine inlet temperature profile can be made to be identical to that of a conventional diffusion flame combustor. That is, XONON was designed to match the turbine inlet temperature and the combustor delta P. This design ensures no impact on turbine performance.

Extensive load tests have also been conducted on the Kawasaki M1A-13A and have validated full power output and efficiency within 0.5% of a standard combustor.

STARTING AND SHUTDOWN

The XONON technology is a new approach to combustion for gas turbine engines. As such, it requires a control strategy geared to its unique capabilities and operating specifications.

Catalytica Combustion Systems engineers—who developed the XONON technology—and Woodward Governor Company engineers—specializing in controls—have cooperatively developed such a control system for the start-up, loading and shutdown of a turbine incorporating XONON.

A control system was developed for and tested on the Kawasaki M1A-13A engine with XONON. The control system incorporates state of the art "feed-forward" and "model-based" control features

(Continued on back)

It Works At 3ppm

Catalytica Combustion Systems, Inc.

430 Ferguson Drive
Mountain View, CA 94043
650-940-6244
fax: 650-965-4345
www.catalytica-inc.com

that allow the engine to be started and accelerated to its idle condition with the push of a button.

This engine has been started over 200 times in ambient conditions that range from 10°F to 98°F. Based on current test results, the starting control algorithm has repeatedly proven to be safe for both the XONON Combustion System and the engine.

As these engine tests continue, the starting control strategy will be further developed to cover a wider range of ambient conditions.

LOADING AND UNLOADING

The XONON system can deliver ultra-low emissions levels over a range of catalyst inlet temperatures and fuel/air ratios. This allows the system to maintain low NO_x while responding to changes in the turbine load.

A turndown in load is accomplished by lowering the fuel flow to the combustor. At reduced loads, XONON emissions performance is maintained by increasing the fuel flow to the preburner to maintain the inlet temperature to the catalyst as the fuel flow is decreased. Fuel flows are adjusted automatically by the combustor control system to maintain optimum performance regardless of changes in the turbine load.

The XONON catalyst in a Kawasaki turbine has demonstrated the ability to meet emissions targets from base-load down to as low as 70% load conditions. The XONON catalyst and the Woodward control systems have also demonstrated the capability to respond to step changes of as much as 80% in load.

The control strategy and system are being further developed to provide the load-step and full-load rejection requirements for other gas turbines.

VIBRATION AND NOISE

GENERAL ELECTRIC RESULTS ♦ KAWASAKI RESULTS

Current regulations in many parts of the world require very low NO_x emissions for gas turbines. This has been a challenge for gas turbines because lean premix combustion systems and other NO_x reducing technologies can encounter flame instabilities that cause pressure pulsations and vibration within the engine. The effects can range from a simple nuisance—the turbine makes disturbing noise when it runs—to a major mechanical failure from vibration induced fatigue of key structural components.

In contrast, the XONON catalytic combustion technology has been demonstrated in full-scale, full-operating conditions for a number of different combustor designs and, in all cases, has exhibited excellent stability with low dynamic pressure pulsations.

Figure 1 shows the magnitude of the pressure fluctuations measured across a broad frequency range in a full-size XONON System. The test was conducted with a 20-inch diameter catalyst on a GE Frame 9 combustor test stand (equivalent to ~8 megawatts of electrical output) under base-load operating conditions. The overall sound intensity of 0.46 psi is significantly below the typical levels in lean premix systems. Under these conditions, NO_x levels of 3.3 parts per million (ppm) were measured.

Similarly low dynamics were achieved with a XONON Combustion System over the entire operating load range on a Kawasaki 1.5 megawatt gas turbine. In this case, the measured dynamics were less than 0.41 psi, and NO_x emissions were below 3 ppm.

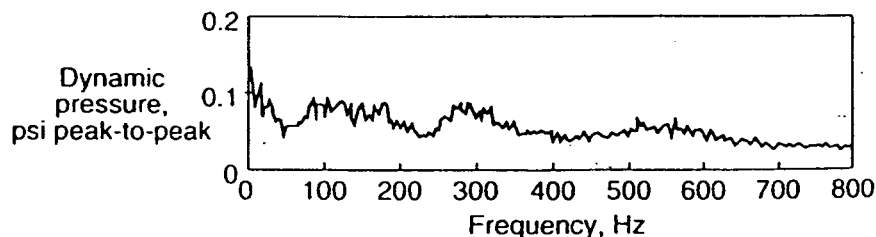


Figure 1: Dynamics measured for a GE Frame 9 combustor under base-load operating conditions.

It Works At 3ppm

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Catalytica

FOR IMMEDIATE RELEASE

NEWS RELEASE

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Lloyd Baylis Ken Darling
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(518) 786-6488

CATALYTICA AND GENERAL ELECTRIC AGREE TO COMMERCIALIZE XONON IN GAS TURBINES

MOUNTAIN VIEW, Calif. -- November 19, 1998 -- Catalytica Combustion Systems, Inc., a subsidiary of Catalytica, Inc. (Nasdaq: CTAL), today announced that GE Power Systems, a business unit of General Electric Company (NYSE: GE), will collaborate with the company to accelerate commercialization of Catalytica's XONON™ pollution prevention technology in GE's gas turbines.

In a definitive agreement signed this week, GE Power Systems and Catalytica agreed to cooperate in the design, application, and commercialization of XONON systems for both new and installed GE E-class and F-class turbines used in power generation and mechanical drive applications. Catalytica's XONON system is a powerful technology that essentially eliminates the formation of nitrogen oxides (NOx) air emissions in gas turbines without impacting the turbine's operating performance. GE and Catalytica's collaborative plan is to design XONON combustion systems for several gas turbines, install and demonstrate these systems at selected customer sites, and then fully commercialize this product offering.

According to Dennis A. Orwig, President & Chief Executive Officer of Catalytica Combustion Systems, Inc., "Most importantly, this agreement demonstrates GE's commitment to working to adapt XONON to GE turbines. The agreement marks the culmination of several years' work at Catalytica and GE to evaluate the economic value and environmental benefit of adapting this very valuable technology to GE's gas turbine line. The fact that the agreement applies to both new and installed GE engines is testament that the XONON technology has broad application and the potential to become an important part of GE's product line."

Robert L. Nardelli, President of GE Power Systems, commented, "As the world sharpens its focus on reducing emissions from fossil fuels, we are constantly looking for new and innovative ways to expand our product and service offerings designed to help our customers improve their environmental performance. Adapting XONON technology for application in our gas turbine product line represents an important step toward offering advanced combustion technology that may provide economic, operational and environmental benefits to both our installed fleet and new units."

**CATALYTICA AND GENERAL ELECTRIC AGREE TO
COMMERCIALIZE XONON IN GAS TURBINES**

2-2-2-2

GE Power Systems is one of GE's major businesses and is the world's leading supplier of products, services and advanced technologies for the energy industry.

Catalytica Combustion Systems, Inc., a majority owned subsidiary of Catalytica, Inc. (Nasdaq: CTAL), develops, manufactures and markets the XONON Combustion System. Catalytica, Inc., through its subsidiaries, provides technologies and advanced products that allow customers and business partners to streamline the cost of bringing products and services to market. Find Catalytica on the Worldwide Web at www.catalytica-inc.com.

This news release contains forward-looking statements regarding the future performance of the XONON Combustion System, the acceleration of commercialization, and Catalytica's collaboration with GE. These statements involve risks and uncertainties, including without limitation, the ability to operate the XONON Combustion System properly and the success of such system in commercial turbines; the timing and extent of market acceptance; and the ability of Catalytica to perform its obligations, including manufacture and supply, under this Agreement in a timely manner. Investors are encouraged to review Catalytica's Form 10-K for the year ending December 31, 1997 and Form 10-Q for the period ending June 3, 1998, for a more complete discussion of factors that could affect Catalytica's future performance.

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--more--



Catalytica

NEWS RELEASE

FOR IMMEDIATE RELEASE

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Trade/Consumer Media
Vanda Meehan
Fleishman-Hillard
(816) 512-2262

FIRST GAS TURBINE WITH CATALYTICA'S XONON INSTALLED TO PRODUCE ELECTRICITY AT A UTILITY

SANTA CLARA, CA, October 8, 1998 – Catalytica Combustion Systems, Inc., a subsidiary of Catalytica, Inc. (Nasdaq: CTAL), today announced the first installation of a gas turbine equipped with the XONON™ Combustion System in a municipally-owned utility for the production of electricity. The System is designed to achieve ultra-low air emissions without impacting the performance of the turbine. The turbine was started up today at the Gianera Generating Station of Silicon Valley Power, a municipally-owned utility serving the City of Santa Clara, California.

The XONON Combustion System, deployed for the first time today in a commercial setting, is designed to enable turbines to produce environmentally-sound power without the need for expensive cleanup solutions. Previously, this XONON system had successfully completed over 1,200 hours of extensive full-scale tests which documented its ability to limit emissions of nitrogen oxides (NOx), a primary air pollutant, to less than 3 parts per million.

"Power production by a XONON-equipped turbine represents a major milestone for the power turbine industry," said Dennis A. Orwig, President and Chief Executive Officer of Catalytica Combustion Systems. "This turbine will be used to provide additional evidence of XONON's durability, reliability, and ultra-low emissions performance during field operations at a utility. Turbine users, original equipment manufacturers, and environmental and energy regulators will have an excellent opportunity to observe XONON in action. Silicon Valley, the center of world-class technology innovation, is an ideal location for starting the first XONON turbine."

"Developed by Catalytica here in Silicon Valley, the XONON technology supports the idea that economic growth and a healthy environment are fully compatible and complementary goals," stated Judy Nadler, Mayor of Santa Clara. "Ultimately, the people of the City of Santa

FIRST GAS TURBINE WITH CATALYTICA'S XONON INSTALLED TO PRODUCE ELECTRICITY AT A UTILITY

2-2-2-2

Clara are the beneficiaries of Silicon Valley Power's commitment to these two goals and to technological innovation. We are delighted to work with Catalytica and to have the opportunity to realize the benefits of XONON in our own local power system. Only in Silicon Valley and in a city as progressive as Santa Clara could we be unveiling this project."

Under the arrangement with Silicon Valley Power, the utility will host the XONON equipped gas turbine system, purchasing its output and delivering it to its electricity customers. Santa Clara residences and businesses thus gain a uniquely clean supply of locally generated power at a fully competitive cost, while Catalytica Combustion Systems has the opportunity to gain real world operating and maintenance experience on a utility system.

Catalytica Combustion Systems, Inc., a majority owned subsidiary of Catalytica, Inc. (Nasdaq: CTAL), manufactures and markets the XONON Combustion System, the ultra-low NOx solution for natural gas turbines. XONON virtually eliminates the formation of oxides of nitrogen, a greenhouse gas, from turbines. This technology broadens the use of turbines in meeting the demand for power generation. Find Catalytica on the World Wide Web at www.catalytica-inc.com.

This news release contains forward-looking statements regarding the future performance of the XONON Combustion System. These statements involve risks and uncertainties, including without limitation, the ability to operate the XONON Combustion System properly and the success of such system in commercial turbines, the ability to perform cost-effectively and in a timely manner. Investors are encouraged to review Catalytica's Form 10-K for the year ending December 31, 1997 and Form 10-Q for the period ending June 3, 1998, for a more complete discussion of factors that could affect Catalytica's future performance.

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Department of Energy
Washington, D.C. 20585

Patent 5,350,510
S.N. 569,066(87)
DOE Cox 5-74346

JAN 27 1992

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Serial No. : 569,066(87)

Inventor(s): Ralph A. Dalla Betta and David R. Sheridan

Filed : August 17, 1990

Title : SO₂ SENSOR AND PROCESS FOR DETECTING SO₂

There are submitted herewith the original and one copy of a License to the Government of the United States, as represented by the United States Department of Energy, covering the invention in the above-identified application, for registry in the Public Register pursuant to Executive Order 9424.

The return of the original License after registry with appropriate notation is requested.

Sincerely,

Richard E. Constant
Assistant General Counsel
for Patents

Enclosures

79.

CONFIRMATORY INSTRUMENT

Title of Invention: SO₂ Sensor and Process for Detecting SO₂
Inventor(s): R. A. Dalla Betta and D. R. Sheridan
Serial No.: 07/569,066 **Filing Date:** 8/17/90
Contractor: Catalytica, Inc.
DOE Contract No.: DE-AC03-86ER80421
Foreign Applications filed in or intended to be
filed at Contractor's expense in (countries): All PCT countries, PRC and Taiwan

The invention identified above is a "subject invention" under the Patent Rights clause included in the above-identified contract with the Department of Energy.

This document is confirmatory of the paid-up license granted to the Government under this contract in this invention, patent application, and any resulting patent, and of all other rights acquired by the Government by the referenced clause, a copy of which is attached hereto and incorporated by reference herein.

The Government is hereby granted an irrevocable power to inspect and make copies of the above-identified patent application.

Signed this 4TH day of DECEMBER, 1991,
(SEAL)

Catalytica, Inc.

(Contractor)

By

Richard Blevins
(Contractor's Official and Title)

430 Ferguson Drive, Mountain View, CA 94043

(Business Address)

ARTICLE X - RIGHTS TO PROPOSAL DATA

Except for technical data contained in pages 5-8 & 10-15, of the Contractor's proposal dated January 14, 1986 which are asserted by the Contractor as being proprietary data, it is agreed that, as a condition of the award of this contract, and notwithstanding the provisions of any notice appearing on the proposal, the Government shall have the right to use, duplicate, disclose and have others to do so for any purpose whatsoever, the technical data contained in the proposal upon which contract is based.

ARTICLE XI - CONTENTS OF CONTRACT

This contract consists of the following:

1. Face Page, Standard Form 26
2. The Schedule, ARTICLES I through XVII
3. Attachment 1, Statement of Work for Phase I
4. Attachment 2, Reporting Requirements Checklist
5. Attachment 3, Contract Clauses for SBIR Contracts
6. Attachment 4, Errata Sheet for Contract Clauses for SBIR Contracts.

ARTICLES I through VI of the Schedule apply only to Phase I.

ARTICLES VII through XI apply to Phase I and Phase II, if any.

ARTICLES XII through XVII apply only to Phase II, if any.

SECTION III - ARTICLES THAT APPLY ONLY TO PHASE II

ARTICLE XII - SCOPE OF WORK FOR PHASE II

In the event that the Government exercises its option for Phase II the Contractor shall proceed with the work as indicated in the Contracting Officer's written notification, subject to ARTICLE XV below.

ARTICLE XIII - PERIOD OF PERFORMANCE FOR PHASE II

The period of performance shall commence the effective date of the Contracting Officer's written notification exercising the option for Phase II and shall expire 120 days from that date, subject to ARTICLE XV below.

ARTICLE XIV - ESTIMATED COST, FOR PHASE II

- (a) The estimated cost for the performance during the 120 days period of Phase II shall be the amount stated in the Contracting Officer's written notification exercising the option for the Phase II, subject to ARTICLE XV below.

1v. DOE PR 9-9.103-3 PATENT INDEMNITY (JUN 1979)

The contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of U.S. Letters Patent (except U.S. Letters Patent issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) resulting from the contractor's: (a) furnishing or supplying standard parts or components which have been sold or offered for sale to public on the commercial open market; or (b) utilizing its normal practices or methods which normally are or have been used in providing goods and services in the commercial open market, in the performance of the contract; or (c) utilizing any parts, components, practices, or methods to the extent to which the contractor has secured indemnification from liability. The foregoing indemnity shall not apply unless the contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply to a claimed infringement which is settled without the consent of the contractor, unless required by final decree of a court of competent jurisdiction or to an infringement resulting from addition to or change in such supplies or components furnished or construction work performed for which addition or change was made subsequent to delivery or performance by the contractor.

1z. DOE PR 9-9.104 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (JUN 1979)

The provisions of this clause shall be applicable only if the amount of this contract exceeds \$10,000.

(a) The contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed hereunder, the contractor shall furnish to the Government when requested by the Contracting Officer, all evidence and information in possession of the contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the contractor has agreed to indemnify the Government.

(c) This clause shall be included in all subcontracts.

1aa. OMB CIRC. A-124 PATENT RIGHTS-SMALL BUSINESS FIRMS OR NONPROFIT ORGANIZATIONS (APR 1984).
TRANS. MEMO. NO.1

(a) Definitions.

(1) "Invention" means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code (U.S.C.).

(2) "Subject Invention" means any invention of the contractor conceived or first actually reduced to practice in the performance of work under this contract.

(3) "Practical Application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

(4) "Made" when used in relation to any invention means the conception or first actual reduction to practice of such invention.

(5) "Small Business Firm" means a domestic small business concern as defined at Section 2 of Public Law 85-536 (15 USC 832) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(6) "Nonprofit Organization" means a domestic university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 USC 501(a)) or any domestic nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(7) "Patent Counsel" means the Department of Energy (DOE) patent counsel assisting the DOE contracting activity.

(b) Allocation of principal rights. The contractor may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 USC 203. With respect to any subject invention in which the contractor retains title, the Federal Government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

(c) Invention disclosure, election of title and filing of patent applications by contractor.

(1) The contractor will disclose each subject invention to the Patent Counsel within two months after the inventor discloses it in writing to contractor personnel responsible for the administration of patent matters. The disclosure to the Patent Counsel shall be in the form of a written report and shall identify the contract under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the Patent Counsel, the contractor will promptly notify the Patent Counsel of the acceptance of any manuscript describing the invention or of any on sale or public use planned by the contractor.

(2) The contractor will elect in writing whether or not to retain title to any such invention by notifying the Patent Counsel within twelve months of disclosure to contractor personnel responsible for patent matters; provided that in any case where publication, on sale or public use has initiated the one year statutory period wherein valid patent protection can still be obtained in the United States, the period for election of title terminates sixty days prior to the end of the statutory period.

(3) The contractor will file its initial patent application on an elected invention within two years after election or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use. The contractor will file patent applications in additional countries within either ten months of the corresponding initial patent application or six months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where such filing has been prohibited by a Secrecy Order.

(4) Requests for extension of the time for disclosure to the Patent Counsel, election, and filing, may, at the discretion of the Patent Counsel be granted.

(d) Conditions when the Government may obtain title.

The contractor will convey to DOE, upon written request, title to any subject invention:

(1) If the contractor fails to disclose or elect the subject invention within the times specified in (c) above, or elects not to retain title. The agency may only request title within sixty days after learning of the contractor's failure to report or elect within the specified times.

(2) In those countries in which the contractor fails to file patent applications within the times specified in (c) above; provided, however, that if the contractor has filed a patent application in a country after the times specified in (c) above but prior to its receipt of the written request of the Patent Counsel, the contractor shall continue to retain title in that country; or

(3) In any country in which the contractor decides not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in a reexamination or opposition proceeding on, a patent on a subject invention.

(e) Minimum rights to contractor.

(1) The contractor will retain a nonexclusive, royalty-free license throughout the world in each subject invention to which the Government obtains title except if the contractor fails to disclose the subject invention within the time specified in (c) above. The contractor's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which the contractor is a part and includes the right to grant sublicenses of the same scope to the extent the contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of DOE except when transferred to the successor of that part of the contractor's business to which the invention pertains.

(2) The contractor's domestic license may be revoked or modified by DOE to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with 10 CFR Part 781 and 41 CFR 101-4. This license will not be revoked in that field of use or the geographical areas in which the contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of DOE to the extent the contractor, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, DOE will furnish the contractor a written notice of its intention to revoke or modify the license, and the contractor will be allowed thirty days (or such other time as may be authorized by DOE for good cause shown by the contractor) after the notice to show cause why the license should not be revoked or modified. The contractor has the right to appeal, in accordance with 10 CFR Part 781, any decision concerning the revocation or modification of its license.

(f) Contractor action to protect Government's interest.

(1) The contractor agrees to execute or to have executed and promptly deliver to the Patent Counsel all instruments necessary to:

(i) Establish or confirm the rights the Government has throughout the world in those subject inventions for which the contractor retains title, and

(ii) Convey title to DOE when requested under (d) above and to enable the Government to obtain patent protection throughout the world in that subject invention.

(2) The contractor agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the contractor each subject invention made under this contract in order that the contractor can comply with the disclosure provisions of (c) above and to execute all papers necessary to file patent applications on subject inventions. The disclosure format should require, as a minimum, the information requested by (c)(1) above. The contractor shall instruct such employees through the employee agreements or suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to United States or foreign statutory bars.

(3) The contractor will notify the Patent Counsel of any decision not to continue prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than thirty days before the expiration of the response period required by the relevant patent office.

(4) The contractor agrees to include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: "This invention was made with Government support under (identify the contract) awarded by the Department of Energy. The Government has certain rights in this invention."

(5) The contractor agrees to:

(i) Provide a report prior to the close-out of the contract listing all subject inventions;

(ii) Provide notification of all subcontracts under this contract for experimental, developmental, demonstration, or research work, the identity of the patent rights clause therein, and copy of each subcontract upon request;

(iii) Provide promptly a copy of the patent application, filing date, serial number, patent number and issue date for any subject invention in any country in which the contractor has applied for a patent.

1bb. DOE PR 9-9.110(c) REPORTING OF - ROYALTIES
(JUN 1979)

If this contract is in an amount which exceeds \$10,000 and if any royalty payments are directly involved in the contract or are reflected in the contract price to the Government, the contractor agrees to report in writing to the Patent Counsel (with notification by Patent Counsel to the Contracting Officer) during the performance of this contract and prior to its completion or final settlement, the amount of any royalties or other payments paid or to be paid by it directly to others in connection with the performance of this contract together with the names and addresses of licensors to whom such payments are made and either the patent numbers involved or such other information as will permit the identification of the patents or other basis on which the royalties are to be paid. The approval of DOE of any individual payments or royalties shall not stop the Government at any time from contesting the enforceability, validity or scope of, or title to, any patent under which a royalty or payments are made.

1cc. DEAR 952.227-73 ADDITIONAL TECHNICAL DATA
REQUIREMENTS (APR 1984)

(a) In addition to the technical data specified elsewhere in this contract to be delivered, the contracting officer may at any time during the contract performance or within one year after final payment call for the contractor to deliver any technical data first produced or specifically used in the performance of this contract, except technical data pertaining to items of standard commercial design.

(b) The provisions of the Rights in Technical Data clause included in this contract are applicable to all technical data called for under this Additional Technical Data Requirements clause. Accordingly, nothing contained in this clause shall require the contractor to actually deliver any technical data, the delivery of which is excused by paragraph (e) of the Rights in Technical Data clause.

(c) When technical data are to be delivered under this clause, the contractor will be compensated for appropriate costs for converting such data into the prescribed form for reproduction, and for delivery.

1dd. GEN. COUNSEL RIGHTS IN TECHNICAL DATA -
MEMO.3-83 SBIR (MAR 1983)

(a) Definitions.

(1) "Technical data" means recorded information regardless of form or characteristic, of a scientific or technical nature. It may, for example, document research, experimental, developmental, or demonstration, to procure, produce, support, maintain, or operate material. The data may be graphic or pictorial delineations in media such as drawings or photographs, text in specifications or related performance or design-type documents or computer software (including computer programs, computer software data bases, and computer software documentation). Examples of technical data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identification, and related information. Technical data as used herein do not include financial reports, cost analyses, and other information incidental to contract administration.

(2) "Proprietary data" means technical data which embody trade secrets developed at private expense, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof provide that such data:

(i) Are not generally known or available from other sources without obligation concerning their confidentiality;

(ii) Have not been made available by the owner to others without obligation concerning its confidentiality; and

(iii) Are not already available to the Government without obligation concerning their confidentiality.

(3) "Contract data" means technical data first produced in the performance of the contract. Technical data which are specified to be delivered under the contract, technical data that may be called for under the Additional Technical Data Requirements clause of the contract, if any, or technical data actually delivered in connection with the contract.

(4) "SBIR data" means contract data developed under a small business innovation research contract issued under the authority of 15 U.S.C. 638 (Pub. L. 97-219, "Small Business Innovation Development Act of 1982") which:

(i) Are not generally known or available from other sources without obligation concerning their confidentiality;

(ii) Have not been made available by the owner to others without obligation concerning its confidentiality; and

(iii) Are not already available to the Government without obligation concerning their confidentiality.

(5) "Unlimited rights" means rights to use, duplicate, or disclose technical data, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so.

(b) Allocation of rights.

(1) The Government shall have:

(i) Unlimited rights in contract data except as otherwise provided below with respect to proprietary data and SBIR data properly marked as authorized by this clause;

(ii) The right to remove, cancel, correct or ignore any incorrect marking or any marking not authorized by this clause on any technical data furnished hereunder, if in response to a written inquiry by DOE concerning the proprietary nature of the markings, the contractor fails to respond thereto within 60 days or fails to substantiate the proprietary nature of the markings. In either case, DOE with notify the contractor of the action taken;

(iii) A royalty-free license for Government use of any technical data, whether patented or not, delivered under this contract, effective upon two years after the completion date of this contract.

(iv) No rights under this contract in any technical data which are not contract data.

(2) The contractor shall have:

(i) Unlimited rights in contract data if first produced in the performance of this contract, subject to patent, security or other provisions of this contract. The contractor agrees that to the extent it receives or is given access to proprietary data or other technical, business or financial data in the form of recorded information from DOE or a DOE contractor or subcontractor, the contractor shall treat such data in accordance with any restrictive legend contained thereon, unless use is specifically authorized by prior written approval of the Contracting Officer.

(ii) The right to withhold proprietary data in accordance with the provisions of this clause, and

(iii) The right to deliver SBIR data marked with the following legend, the terms of which shall be binding on the Government.

RIGHTS IN SBIR DATA

This SBIR data was furnished under Contract No. 0000 with the U.S. Department of Energy (completion date: 00/00/00) with the express limitations that (a) this data may only be used or disclosed by the Government for purposes of program evaluation, and (b) this data may not be disclosed outside the Government without prior permission of the contractor except for purposes of program evaluation under the restriction that the data be retained in confidence and not be further disclosed. These limitations shall apply only for a period ending two years after the completion date of this contract.

(c) Copyrighted material.

(1) With prior written permission of the Contracting Officer, the contractor normally may copyright and publish any contract data first produced in the performance of the contract. The Government reserves for itself and others acting on its behalf a royalty-free, nonexclusive, irrevocable, world-wide license to publish, distribute, translate, duplicate, exhibit and perform any such data copyrighted by the contractor.

(2) The contractor agrees not to include in the technical data delivered under the contract any material copyrighted by the contractor and not to knowingly include any material copyrighted by others, without first granting or obtaining at no cost a license therein for the benefit of the Government of the same scope as set forth in paragraph (c)(1) above. If such royalty-free license is unavailable and the contractor nevertheless determines that such copyrighted material must be included in the technical data to be delivered, rather than merely incorporated therein by reference, the contractor shall obtain the written authorization of the Contracting Officer to include such copyrighted material in the technical data prior to its delivery.

(d) Subcontracting

It is the responsibility of the contractor to obtain from its subcontractors technical data and rights therein, on behalf of the Government, necessary to fulfill the contractor's obligations to the Government with respect to such data. In the event of refusal by a subcontractor to accept a clause affording the Government such rights, the contractor shall:

(1) Promptly submit written notice to the Contracting Officer setting forth reasons for the subcontractor refusal and other pertinent information which may expedite disposition of the matter; and

(2) Not proceed with the subcontract without the written authorization of the Contracting Officer.

(e) Withholding of proprietary data.

Notwithstanding the inclusion of the Additional Technical Data Requirements clause in this contract or any provision of this contract specifying the delivery of technical data, the contractor may withhold proprietary data from delivery, provided that the contractor furnishes in lieu of any such proprietary data so withheld technical data disclosing the source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements ("Form, Fit and Function" data, e.g., specification control drawings, catalog sheets, envelope drawings, etc.), or a general description of such proprietary data where "Form, Fit and Function" data are not applicable. The Government shall acquire no rights to any proprietary data so withheld except that such data shall be subject to the "inspection rights" provisions of paragraph (f), and, if included, the "limited rights in proprietary data" provisions of paragraph (g) and the "Contractor licensing" provisions of paragraph (h).

(f) Inspection rights.

Except as may be otherwise specified in this contract for specific items of proprietary data which are not subject to this paragraph, the Contracting Officer's representatives, at all reasonable times up to three years after final payment under this contract, may inspect at the contractor's facility any proprietary data withheld under paragraph (e) for the purposes of verifying that such data properly fall within the withholding provision of paragraph (e), or for evaluating work performance.

(g) Limited rights in proprietary data.

Except as may be otherwise specified in this contract as technical data which are not subject to this paragraph, the contractor shall, upon written request from the Contracting Officer at any time prior to three years after final payment under this contract, promptly deliver to the Government any "proprietary data" withheld pursuant to paragraph (e) of the Rights in Technical Data clause of this contract. The following legend and no other is authorized to be affixed on any "proprietary data" delivered pursuant to this provision, provided the "proprietary data" meets the conditions for initial withholding under paragraph (e) of the Rights in Technical Data clause. The Government will thereafter treat the "proprietary data" in accordance with such legend.

LIMITED RIGHTS LEGEND

This "proprietary data," furnished under "Contract No. 0000" with the U.S. Department of Energy (and Purchase Order No. 0000 if applicable) may be duplicated and used by the Government with the express limitations that the "proprietary data" may not be disclosed outside the Government or be used for purposes of manufacture without prior permission of the contractor, except that further disclosure or use may be made solely for the following purposes:

(a) This "proprietary data" may be disclosed for evaluation purposes under the restriction that the "proprietary data" be

CONFIRMATORY INSTRUMENT

Title of Invention: NOx Sensor and Process for Detecting NOx
Inventor(s): R. A. Dalla Betta, D. R. Sheridan and D. L. Reed
Serial No.: 07/536,895 Filing Date: 6/12/90
Contractor: Catalytica, Inc.
DOE Contract No.: DE-AC03-86ER80421
Foreign Applications filed in or intended to be
filed at Contractor's expense in (countries): All PCT countries, PRC and Taiwan

The invention identified above is a "subject invention" under the Patent Rights clause included in the above-identified contract with the Department of Energy.

This document is confirmatory of the paid-up license granted to the Government under this contract in this invention, patent application, and any resulting patent, and of all other rights acquired by the Government by the referenced clause, a copy of which is attached hereto and incorporated by reference herein.

The Government is hereby granted an irrevocable power to inspect and make copies of the above-identified patent application.

Signed this 4TH day of DECEMBER, 1991,
(SEAL)

Catalytica, Inc.

(Contractor)

By *David B. Reed*
(Contractor's Official and Title)

430 Ferguson Drive, Mountain View, CA 94043

(Business Address)

ARTICLE X - RIGHTS TO PROPOSAL DATA

Except for technical data contained in pages 5-8 & 10-15, of the Contractor's proposal dated January 14, 1986 which are asserted by the Contractor as being proprietary data, it is agreed that, as a condition of the award of this contract, and notwithstanding the provisions of any notice appearing on the proposal, the Government shall have the right to use, duplicate, disclose and have others to do so for any purpose whatsoever, the technical data contained in the proposal upon which contract is based.

ARTICLE XI - CONTENTS OF CONTRACT

This contract consists of the following:

1. Face Page, Standard Form 26
2. The Schedule, ARTICLES I through XVII
3. Attachment 1, Statement of Work for Phase I
4. Attachment 2, Reporting Requirements Checklist
5. Attachment 3, Contract Clauses for SBIR Contracts
6. Attachment 4, Errata Sheet for Contract Clauses for SBIR Contracts.

ARTICLES I through VI of the Schedule apply only to Phase I.

ARTICLES VII through XI apply to Phase I and Phase II, if any.

ARTICLES XII through XVII apply only to Phase II, if any.

SECTION III - ARTICLES THAT APPLY ONLY TO PHASE II

ARTICLE XII - SCOPE OF WORK FOR PHASE II

In the event that the Government exercises its option for Phase II the Contractor shall proceed with the work as indicated in the Contracting Officer's written notification, subject to ARTICLE XV below.

ARTICLE XIII - PERIOD OF PERFORMANCE FOR PHASE II

The period of performance shall commence the effective date of the Contracting Officer's written notification exercising the option for Phase II and shall expire 120 days from that date, subject to ARTICLE XV below.

ARTICLE XIV - ESTIMATED COST, FOR PHASE II

- (a) The estimated cost for the performance during the 120 days period of Phase II shall be the amount stated in the Contracting Officer's written notification exercising the option for the Phase II, subject to ARTICLE XV below.

1v. DOE PR 9-9.103-3 PATENT INDEMNITY (JUN 1979)

The contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of U.S. Letters Patent (except U.S. Letters Patent issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) resulting from the contractor's: (a) furnishing or supplying standard parts or components which have been sold or offered for sale to public on the commercial open market; or (b) utilizing its normal practices or methods which normally are or have been used in providing goods and services in the commercial open market, in the performance of the contract; or (c) utilizing any parts, components, practices, or methods to the extent to which the contractor has secured indemnification from liability. The foregoing indemnity shall not apply unless the contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply to a claimed infringement which is settled without the consent of the contractor, unless required by final decree of a court of competent jurisdiction or to an infringement resulting from addition to or change in such supplies or components furnished or construction work performed for which addition or change was made subsequent to delivery or performance by the contractor.

1z. DOE PR 9-9.104 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (JUN 1979)

The provisions of this clause shall be applicable only if the amount of this contract exceeds \$10,000.

(a) The contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed hereunder, the contractor shall furnish to the Government when requested by the Contracting Officer, all evidence and information in possession of the contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the contractor has agreed to indemnify the Government.

(c) This clause shall be included in all subcontracts.

1aa. OMB CIRC. A-124 PATENT RIGHTS-SMALL BUSINESS FIRMS OR NONPROFIT ORGANIZATIONS (APR 1984).
TRANS. MEMO. NO.1

(a) Definitions.

(1) "Invention" means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code (U.S.C.).

(2) "Subject Invention" means any invention of the contractor conceived or first actually reduced to practice in the performance of work under this contract.

(3) "Practical Application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

(4) "Made" when used in relation to any invention means the conception or first actual reduction to practice of such invention.

(5) "Small Business Firm" means a domestic small business concern as defined at Section 2 of Public Law 85-536 (15 USC 632) and implementing regulations of the Administrator of the Small Business Administration, for the purpose of this clause, the size standard for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(6) "Nonprofit Organization" means a domestic university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 USC 501(a)) or any domestic nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(7) "Patent Counsel" means the Department of Energy (DOE) patent counsel assisting the DOE contracting activity.

(b) Allocation of principal rights. The contractor may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 USC 203. With respect to any subject invention in which the contractor retains title, the Federal Government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

(c) Invention disclosure, election of title and filing of patent applications by contractor.

(1) The contractor will disclose each subject invention to the Patent Counsel within two months after the inventor discloses it in writing to contractor personnel responsible for the administration of patent matters. The disclosure to the Patent Counsel shall be in the form of a written report and shall identify the contract under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the Patent Counsel, the contractor will promptly notify the Patent Counsel of the acceptance of any manuscript describing the invention or of any on sale or public use planned by the contractor.

(2) The contractor will elect in writing whether or not to retain title to any such invention by notifying the Patent Counsel within twelve months of disclosure to contractor personnel responsible for patent matters; provided that in any case where publication, on sale or public use has initiated the one year statutory period wherein valid patent protection can still be obtained in the United States, the period for election of title terminates sixty days prior to the end of the statutory period.

(3) The contractor will file its initial patent application on an elected invention within two years after election or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use. The contractor will file patent applications in additional countries within either ten months of the corresponding initial patent application or six months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where such filing has been prohibited by a Secrecy Order.

(4) Requests for extension of the time for disclosure to the Patent Counsel, election, and filing, may, at the discretion of the Patent Counsel be granted.

(d) Conditions when the Government may obtain title.

The contractor will convey to DOE, upon written request, title to any subject invention:

(1) If the contractor fails to disclose or elect the subject invention within the times specified in (c) above, or elects not to retain title. The agency may only request title within sixty days after learning of the contractor's failure to report or elect within the specified times.

(2) In those countries in which the contractor fails to file patent applications within the times specified in (c) above; provided, however, that if the contractor has filed a patent application in a country after the times specified in (c) above but prior to its receipt of the written request of the Patent Counsel, the contractor shall continue to retain title in that country; or

(3) In any country in which the contractor decides not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in a reexamination or opposition proceeding on, a patent on a subject invention.

(e) Minimum rights to contractor.

(1) The contractor will retain a nonexclusive, royalty-free license throughout the world in each subject invention to which the Government obtains title except if the contractor fails to disclose the subject invention within the time specified in (c) above. The contractor's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which the contractor is a part and includes the right to grant sublicenses of the same scope to the extent the contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of DOE except when transferred to the successor of that part of the contractor's business to which the invention pertains.

(2) The contractor's domestic license may be revoked or modified by DOE to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with 10 CFR Part 781 and 41 CFR 101-4. This license will not be revoked in that field of use or the geographical areas in which the contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of DOE to the extent the contractor, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, DOE will furnish the contractor a written notice of its intention to revoke or modify the license, and the contractor will be allowed thirty days (or such other time as may be authorized by DOE for good cause shown by the contractor) after the notice to show cause why the license should not be revoked or modified. The contractor has the right to appeal, in accordance with 10 CFR Part 781, any decision concerning the revocation or modification of its license.

(f) Contractor action to protest Government's interest.

(1) The contractor agrees to execute or to have executed and promptly deliver to the Patent Counsel all instruments necessary to:

(i) Establish or confirm the rights the Government has throughout the world in those subject inventions for which the contractor retains title, and

(ii) Convey title to DOE when requested under (d) above and to enable the Government to obtain patent protection throughout the world in that subject invention.

(2) The contractor agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the contractor each subject invention made under this contract in order that the contractor can comply with the disclosure provisions of (c) above and to execute all papers necessary to file patent applications on subject inventions. The disclosure format should require, as a minimum, the information requested by (c)(1) above. The contractor shall instruct such employees through the employee agreements or suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to United States or foreign statutory bars.

(3) The contractor will notify the Patent Counsel of any decision not to continue prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than thirty days before the expiration of the response period required by the relevant patent office.

(4) The contractor agrees to include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement, "This invention was made with Government support under (identify the contract) awarded by the Department of Energy. The Government has certain rights in this invention."

(5) The contractor agrees to:

(i) Provide a report prior to the close-out of the contract listing all subject inventions;

(ii) Provide notification of all subcontracts under this contract for experimental, developmental, demonstration, or research work, the identity of the patent rights clause therein, and copy of each subcontract upon request;

(iii) Provide promptly a copy of the patent application, filing date, serial number, patent number and issue date for any subject invention in any country in which the contractor has applied for a patent.

1bb. DOE PR 9-9.110(c) REPORTING OF ROYALTIES
(JUN 1979)

If this contract is in an amount which exceeds \$10,000 and if any royalty payments are directly involved in the contract or are reflected in the contract price to the Government, the contractor agrees to report in writing to the Patent Counsel (with notification by Patent Counsel to the Contracting Officer) during the performance of this contract and prior to its completion or final settlement, the amount of any royalties or other payments paid or to be paid by it directly to others in connection with the performance of this contract together with the names and addresses of licensors to whom such payments are made and either the patent numbers involved or such other information as will permit the identification of the patents or other basis on which the royalties are to be paid. The approval of DOE of any individual payments or royalties shall not stop the Government at any time from contesting the enforceability, validity or scope of, or title to, any patent under which a royalty or payments are made.

1cc. DEAR 952.227-73 ADDITIONAL TECHNICAL DATA REQUIREMENTS (APR 1984)

(a) In addition to the technical data specified elsewhere in this contract to be delivered, the contracting officer may at any time during the contract performance or within one year after final payment call for the contractor to deliver any technical data first produced or specifically used in the performance of this contract, except technical data pertaining to items of standard commercial design.

(b) The provisions of the Rights in Technical Data clause included in this contract are applicable to all technical data called for under this Additional Technical Data Requirements clause. Accordingly, nothing contained in this clause shall require the contractor to actually deliver any technical data, the delivery of which is excused by paragraph (c) of the Rights in Technical Data clause.

(c) When technical data are to be delivered under this clause, the contractor will be compensated for appropriate costs for converting such data into the prescribed form for reproduction, and for delivery.

1dd. GEN. COUNSEL RIGHTS IN TECHNICAL DATA -
MEMO.3-83 SBIR (MAR 1983)

(a) Definitions.

(1) "Technical data" means recorded information regardless of form or characteristic, of a scientific or technical nature. It may, for example, document research, experimental, developmental, or demonstration, to procure, produce, support, maintain, or operate material. The data may be graphic or pictorial delineations in media such as drawings or photographs, text in specifications or related performance or design-type documents or computer software (including computer programs, computer software data bases, and computer software documentation). Examples of technical data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identification, and related information. Technical data as used herein do not include financial reports, cost analyses, and other information incidental to contract administration.

(2) "Proprietary data" means technical data which embody trade secrets developed at private expense, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof provide that such data:

(i) Are not generally known or available from other sources without obligation concerning their confidentiality;

(ii) Have not been made available by the owner to others without obligation concerning its confidentiality; and

(iii) Are not already available to the Government without obligation concerning their confidentiality.

(3) "Contract data" means technical data first produced in the performance of the contract, technical data which are specified to be delivered under the contract, technical data that may be called for under the Additional Technical Data Requirements clause of the contract, if any, or technical data actually delivered in connection with the contract.

(4) "SBIR data" means contract data developed under a small business innovation research contract issued under the authority of 15 U.S.C. 638 (Pub. L. 47-219, "Small Business Innovation Development Act of 1982") which:

(i) Are not generally known or available from other sources without obligation concerning their confidentiality;

(ii) Have not been made available by the owner to others without obligation concerning its confidentiality; and

(iii) Are not already available to the Government without obligation concerning their confidentiality.

(5) "Unlimited rights" means rights to use, duplicate, or disclose technical data, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so.

(b) Allocation of rights.

(1) The Government shall have:

(i) Unlimited rights in contract data except as otherwise provided below with respect to proprietary data and SBIR data properly marked as authorized by this clause;

(ii) The right to remove, cancel, correct or ignore any incorrect marking or any marking not authorized by this clause on any technical data furnished hereunder, if in response to a written inquiry by DOE concerning the proprietary nature of the markings, the contractor fails to respond thereto within 60 days or fails to substantiate the proprietary nature of the markings. In either case, DOE will notify the contractor of the action taken;

(iii) A royalty-free license for Government use of any technical data, whether patented or not, delivered under this contract, effective upon two years after the completion date of this contract.

(iv) No rights under this contract in any technical data which are not contract data.

(2) The contractor shall have:

(i) Unlimited rights in contract data if first produces in the performance of this contract, subject to patent, security or other provisions of this contract. The contractor agrees that to the extent it receives or is given access to proprietary data or other technical, business or financial data in the form of recorded information from DOE or a DOE contractor or subcontractor, the contractor shall treat such data in accordance with any restrictive legend contained thereon, unless use is specifically authorized by prior written approval of the Contracting Officer.

(ii) The right to withhold proprietary data in accordance with the provisions of this clause, and

(iii) The right to deliver SBIR data marked with the following legend, the terms of which shall be binding on the Government.

RIGHTS IN SBIR DATA

This SBIR data was furnished under Contract No. 0000 with the U.S. Department of Energy (completion date: 00/00/00) with the express limitations that (a) this data may only be used or disclosed by the Government for purposes of program evaluation, and (b) this data may not be disclosed outside the Government without prior permission of the contractor except for purposes of program evaluation under the restriction that the data be retained in confidence and not be further disclosed. These limitations shall apply only for a period ending two years after the completion date of this contract.

(c) Copyrighted material.

(1) With prior written permission of the Contracting Officer, the contractor normally may copyright and publish any contract data first produced in the performance of the contract. The Government reserves for itself and others acting on its behalf a royalty-free, nonexclusive, irrevocable, world-wide license to publish, distribute, translate, duplicate, exhibit and perform any such data copyrighted by the contractor.

(2) The contractor agrees not to include in the technical data delivered under the contract any material copyrighted by the contractor and not to knowingly include any material copyrighted by others, without first granting or obtaining at no cost a license therein for the benefit of the Government of the same scope as set forth in paragraph (c)(1) above. If such royalty-free license is unavailable and the contractor nevertheless determines that such copyrighted material must be included in the technical data to be delivered, rather than merely incorporated therein by reference, the contractor shall obtain the written authorization of the Contracting Officer to include such copyrighted material in the technical data prior to its delivery.

(d) Subcontracting

It is the responsibility of the contractor to obtain from its subcontractors technical data and rights therein, on behalf of the Government, necessary to fulfill the contractor's obligations to the Government with respect to such data. In the event of refusal by a subcontractor to accept a clause affording the Government such rights, the contractor shall:

(1) Promptly submit written notice to the Contracting Officer setting forth reasons for the subcontractor refusal and other pertinent information which may expedite disposition of the matter; and

(2) Not proceed with the subcontract without the written authorization of the Contracting Officer.

(e) Withholding of proprietary data.

Notwithstanding the inclusion of the Additional Technical Data Requirements clause in this contract or any provision of this contract specifying the delivery of technical data, the contractor may withhold proprietary data from delivery, provided that the contractor furnishes in lieu of any such proprietary data so withheld technical data disclosing the source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements ("Form, Fit and Function" data, e.g., specification control drawings, catalog sheets, envelope drawings, etc.), or a general description of such proprietary data where "Form, Fit and Function" data are not applicable. The Government shall acquire no rights to any proprietary data so withheld except that such data shall be subject to the "inspection rights" provisions of paragraph (f), and, if included, the "limited rights in proprietary data" provisions of paragraph (g) and the "Contractor licensing" provisions of paragraph (h).

(f) Inspection rights.

Except as may be otherwise specified in this contract for specific items of proprietary data which are not subject to this paragraph, the Contracting Officer's representatives, at all reasonable times up to three years after final payment under this contract, may inspect at the contractor's facility any proprietary data withheld under paragraph (e) for the purposes of verifying that such data properly fall within the withholding provision of paragraph (e), or for evaluating work performance.

(g) Limited rights in proprietary data.

Except as may be otherwise specified in this contract as technical data which are not subject to this paragraph, the contractor shall, upon written request from the Contracting Officer at any time prior to three years after final payment under this contract, promptly deliver to the Government any "proprietary data" withheld pursuant to paragraph (e) of the Rights in Technical Data clause of this contract. The following legend and no other is authorized to be affixed on any "proprietary data" delivered pursuant to this provision, provided the "proprietary data" meets the conditions for initial withholding under paragraph (e) of the Rights in Technical Data clause. The Government will thereafter treat the "proprietary data" in accordance with such legend.

LIMITED RIGHTS LEGEND

This "proprietary data," furnished under "Contract No. 0000" with the U.S. Department of Energy (and Purchase Order No. 0000 if applicable) may be duplicated and used by the Government with the express limitations that the "proprietary data" may not be disclosed outside the Government or be used for purposes of manufacture without prior permission of the contractor, except that further disclosure or use may be made solely for the following purposes:

(a) This "proprietary data" may be disclosed for evaluation purposes under the restriction that the "proprietary data" be

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Tuesday, September 25, 2001 2:14 PM
To: 'David Katz'; Ekimoff, Lana; 'R Federal Record'
Cc: 'Carol Balassa'; 'Steve Fabry'; 'Fran Huegel'
Subject: RE: Returns in Kind in Singapore FTA

David,

Thank you for the opportunity to comment.

Harvetta

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 4:45 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa; Steve Fabry; Fran Huegel
Subject: RE: Returns in Kind in Singapore FTA

Harvetta

L
pr

-David

>
>>> "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov> 09/24/01 01:36PM >>>
Lana Ekimoff

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 1:12 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa
Subject: Returns in Kind in Singapore FTA

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Tuesday, September 25, 2001 2:14 PM
To: 'David Katz'; Ekimoff, Lana; 'R Federal Record'
Cc: 'Carol Balassa'; 'Steve Fabry'; 'Fran Huegel'
Subject: RE: Returns in Kind in Singapore FTA

David.

C

Harvetta

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 4:45 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa; Steve Fabry; Fran Huegel
Subject: RE: Returns in Kind in Singapore FTA

Harvetta,

pro.

-David

>
>>> "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov> 09/24/01 01:36PM >>>

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 1:12 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa
Subject: Returns in Kind in Singapore FTA

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Monday, September 17, 2001 3:52 PM
To: 'Carol Balassa'
Subject: RE: Objectives

(b)(3)

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Friday, September 07, 2001 5:05 PM
To: Asamoah, Harvetta; R Federal Record
Subject: RE: Objectives

(b)(5)

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela;
Mcleod.Barbara@epa.gov%internet; cbalassa@ustr.gov%internet;
David_Downes@ios.doi.gov%internet; richard.larm@justice.gov%internet;
Richard_Boll@ita.doc.gov%internet; sara_hagigh@ita.doc.gov%internet;
WestonST@state.gov%internet; WheelerE@state.gov%internet;
jbaumert@usitc.gov%internet
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives

(b)(5)

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

(

(b)(3)

Tom

<<USTR Key Objectives Aug 15 2001.doc>>

(b)(3)

Asamoah, Harvetta

From: melly@usitc.gov%internet [melly@usitc.gov]
Sent: Thursday, August 16, 2001 4:06 PM
To: Cochran, Pamela; Ekimoff, Lana; Asamoah, Harvetta; 'cbalassa@ustr.gov%internet';
'David_Downes@ios.doi.gov%internet'; 'McLeod.Barbara@epa.gov%internet';
'richard.larm@justice.gov%internet'; 'Richard_Boll@ita.doc.gov%internet';
'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet';
'WheelerE@state.gov%internet'; jbaumert@usitc.gov%internet
Cc: 'sfabry@ustr.gov%internet'
Subject: RE: Objectives

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inte

----- Original Text -----

From: "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov>, on 8/16/01 2:36 PM:
To: iSMTP@MASTER7@ADP7["Ekimoff, Lana"
<Lana.Ekimoff@hq.doe.gov>], iSMTP@MASTER7@ADP7["Cochran, Pamela"
<Pamela.COCHRAN@hq.doe.gov>], iSMTP@MASTER7@ADP7["McLeod.Barbara@epa.gov%intern
et"
<McLeod.Barbara@epa.gov>], iSMTP@MASTER7@ADP7["cbalassa@ustr.gov%internet"
<cbalassa@ustr.gov>], iSMTP@MASTER7@ADP7["David_Downes@ios.doi.gov%internet"
<David_Downes@ios.doi.gov>], iSMTP@MASTER7@ADP7["richard.larm@justice.gov%inter
net"
<richard.larm@justice.gov>], iSMTP@MASTER7@ADP7["Richard_Boll@ita.doc.gov%inter
net"
<Richard_Boll@ita.doc.gov>], iSMTP@MASTER7@ADP7["sara_hagigh@ita.doc.gov%intern
et"
<sara_hagigh@ita.doc.gov>], iSMTP@MASTER7@ADP7["WestonST@state.gov%internet"
<WestonST@state.gov>], iSMTP@MASTER7@ADP7["WheelerE@state.gov%internet"
<WheelerE@state.gov>], Christopher Melly@SI@ID, Jennifer Baumert@SI@ID
Cc: iSMTP@MASTER7@ADP7["sfabry@ustr.gov%internet" <sfabry@ustr.gov>]

Companies would still call for privatization, divestiture and unbundling:

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela;
Mcleod.Barbara@epa.gov%internet; cbalassa@ustr.gov%internet;
David_Downes@ios.doi.gov%internet; richard.larm@justice.gov%internet;
Richard_Boll@ita.doc.gov%internet; sara_hagigh@ita.doc.gov%internet;
WestonST@state.gov%internet; WheelerE@state.gov%internet;
jbaumert@usitc.gov%internet
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

Chris,

Tom

<<USTR Key Objectives Aug 15 2001.doc>>

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may contain confidential and privileged material for the sole use of the intended recipient (s). Any review, use, distribution or disclosure by others

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to receive for the recipient), please contact the sender or reply to Enron Corp. at enron.messaging.administration@enron.com and delete all copies of the message. This e-mail (and any attachments hereto) are not intended to be

an offer (or an acceptance) and do not create or evidence a binding and enforceable contract between Enron Corp. (or any of its affiliates) and the intended recipient or any other party, and may not be relied on by anyone as

the basis of a contract by estoppel or otherwise. Thank you.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, August 16, 2001 2:37 PM
To: 'melly@usitc.gov%internet'; Ekimoff, Lana; Cochran, Pamela; 'Mcleod.Barbara@epa.gov%internet'; 'cbalassa@ustr.gov%internet'; 'David_Downes@ios.doi.gov%internet'; 'richard.larm@justice.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet'; 'WheelerE@state.gov%internet'; 'jbaumert@usitc.gov%internet'
Cc: 'sfabry@ustr.gov%internet'
Subject: RE: Objectives

v. (6)5

il
it

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; 'Mcleod.Barbara@epa.gov%internet'; 'cbalassa@ustr.gov%internet'; 'David_Downes@ios.doi.gov%internet'; 'richard.larm@justice.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet'; 'WheelerE@state.gov%internet'; 'jbaumert@usitc.gov%internet'
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives

(6)5

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

(b)(5) -

Tom

<<USTR Key Objectives Aug 15 2001.doc>>

This e-mail is the property of Enron Corp. and/or its relevant affiliate and may contain confidential and privileged material for the sole use of the intended recipient (s). Any review, use, distribution or disclosure by others is strictly prohibited. If you are not the intended recipient (or authorized to receive for the recipient), please contact the sender or reply to Enron Corp. at enron.messaging.administration@enron.com and delete all copies of the message. This e-mail (and any attachments hereto) are not intended to be an offer (or an acceptance) and do not create or evidence a binding and enforceable contract between Enron Corp. (or any of its affiliates) and the intended recipient or any other party, and may not be relied on by anyone as the basis of a contract by estoppel or otherwise. Thank you.

Asamoah, Harvetta

From: melly@usitc.gov%internet [melly@usitc.gov]
Sent: Thursday, August 16, 2001 9:45 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; cbalassa@ustr.gov%internet;
David_Downes@ios.doi.gov%internet; Mcleod.Barbara@epa.gov%internet;
richard.larm@justice.gov%internet; Richard_Boll@ita.doc.gov%internet;
sara_hagigh@ita.doc.gov%internet; WestonST@state.gov%internet;
WheelerE@state.gov%internet; jbaumert@usitc.gov%internet
Cc: sfabry@ustr.gov%internet
Subject: RE: Objectives

Chris

----- Original Text -----

From: "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov>, on 8/16/01 9:10 AM:
To: iSMTP@MASTER7@ADP7["Ekimoff, Lana"
<Lana.Ekimoff@hq.doe.gov>], iSMTP@MASTER7@ADP7["Cochran, Pamela"
<Pamela.COCHRAN@hq.doe.gov>], iSMTP@MASTER7@ADP7["Mcleod.Barbara@epa.gov%intern
et"
<Mcleod.Barbara@epa.gov>], iSMTP@MASTER7@ADP7["cbalassa@ustr.gov%internet"
<cbalassa@ustr.gov>], iSMTP@MASTER7@ADP7["David_Downes@ios.doi.gov%internet"
<David_Downes@ios.doi.gov>], iSMTP@MASTER7@ADP7["richard.larm@justice.gov%inter
net"
<richard.larm@justice.gov>], iSMTP@MASTER7@ADP7["Richard_Boll@ita.doc.gov%inter
net"
<Richard_Boll@ita.doc.gov>], iSMTP@MASTER7@ADP7["sara_hagigh@ita.doc.gov%intern
et"
<sara_hagigh@ita.doc.gov>], iSMTP@MASTER7@ADP7["WestonST@state.gov%internet"
<WestonST@state.gov>], iSMTP@MASTER7@ADP7["WheelerE@state.gov%internet"
<WheelerE@state.gov>], Christopher Melly@SI@ID, Jennifer Baumert@SI@ID
Cc: iSMTP@MASTER7@ADP7["sfabry@ustr.gov%internet" <sfabry@ustr.gov>]

(b)(5)

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvella; Ekimoff, Lana; Cochran, Pamela;
Mcleod.Barbara@epa.gov%internet; cbalassa@ustr.gov%internet;
David_Downes@ios.doi.gov%internet; richard.larm@justice.gov%internet;
Richard_Boll@ita.doc.gov%internet; sara_hagigh@ita.doc.gov%internet;
WestonST@state.gov%internet; WheelerE@state.gov%internet;
jbaumert@usitc.gov%internet
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives

(b)(5)

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

(b)(5)

Tom

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the basis of a contract by estoppel or otherwise. Thank you.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, August 16, 2001 9:10 AM
To: 'melly@usitc.gov%internet'; Ekimoff, Lana; Cochran, Pamela; 'McLeod.Barbara@epa.gov%internet'; 'cbalassa@ustr.gov%internet'; 'David_Downes@ios.doi.gov%internet'; 'richard.larm@justice.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet'; 'WheelerE@state.gov%internet'; 'jbaumert@usitc.gov%internet'
Cc: 'sfabry@ustr.gov%internet'
Subject: RE: Objectives

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; 'McLeod.Barbara@epa.gov%internet'; 'cbalassa@ustr.gov%internet'; 'David_Downes@ios.doi.gov%internet'; 'richard.larm@justice.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet'; 'WheelerE@state.gov%internet'; 'jbaumert@usitc.gov%internet'
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

(b)(5)

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Asamoah, Harvetta

From: Wheeler, Evelyn [WheelerE@state.gov]
Sent: Wednesday, August 15, 2001 12:48 PM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; 'melly(a)usitc.gov'; 'McLeod.Barbara(a)epa.gov'; 'cbalassa(a)ustr.gov'; 'David(u)Downes(a)ios.doi.gov'; 'richard.larm(a)justice.gov'; 'Richard(u)Boll(a)ita.doc.gov'; 'sara(u)hagigh(a)ita.doc.gov'; Weston, Steven T; 'jbaumert(a)usitc.gov'
Cc: 'sfabry(a)ustr.gov'
Subject: RE: Objectives

(b)(5)

-----Original Message-----

From: melly@usitc.gov [mailto:melly@usitc.gov]
Sent: Wednesday, August 15, 2001 12:24 PM
To: McLeod.Barbara@epa.gov; cbalassa@ustr.gov; David_Downes@ios.doi.gov; richard.larm@justice.gov; harvetta.asamoah@hq.doe.gov; Lana.ekimoff@hq.doe.gov; Pamela.cochran@hq.doe.gov; Richard_Boll@ita.doc.gov; sara_hagigh@ita.doc.gov; WestonST@state.gov; WheelerE@state.gov; jbaumert@usitc.gov
Cc: sfabry@ustr.gov
Subject: fwd: Objectives

(b)(5)

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

(b)(5)

Tom

<<USTR Key Objectives Aug 15 2001.doc>>

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intended recipient (s). Any review, use, distribution or disclosure by
others

is strictly prohibited. If you are not the intended recipient (or authorized

to receive for the recipient), please contact the sender or reply to Enron
Corp. at enron.messaging.administration@enron.com and delete all copies of
the message. This e-mail (and any attachments hereto) are not intended to be

an offer (or an acceptance) and do not create or evidence a binding and
enforceable contract between Enron Corp. (or any of its affiliates) and the
intended recipient or any other party, and may not be relied on by anyone as

the basis of a contract by estoppel or otherwise. Thank you.

Asamoah, Harvetta

From: melly@usitc.gov%internet [melly@usitc.gov]
Sent: Wednesday, August 15, 2001 11:55 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; Mcleod.Barbara@epa.gov%internet;
cballassa@ustr.gov%internet; David_Downes@ios.doi.gov%internet;
richard.larm@justice.gov%internet; Richard_Boll@ita.doc.gov%internet;
sara_hagigh@ita.doc.gov%internet; WestonST@state.gov%internet;
WheelerE@state.gov%internet; jbaumert@usitc.gov%internet
Cc: sfabry@ustr.gov%internet
Subject: fwd: Objectives



USTR Key Objectives
Aug 15 200...

Chris

----- Original Text -----

From: "Briggs, Tom" <Tom.Briggs@ENRON.com>, on 8/15/01 10:12 AM:
To: Christopher Melly@SI@ID

Tom

<<USTR Key Objectives Aug 15 2001.doc>>

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intended recipient or any other party, and may not be relied on by anyone as the basis of a contract by estoppel or otherwise. Thank you.

EXPANDING TRADE AND INVESTMENT IN ENERGY AND ENERGY SERVICES: KEY OBJECTIVES OF WTO NEGOTIATION

1. Expanding trade and investment in the energy sector requires a departure from traditional monopoly and/or state-owned energy sector structures that prevail throughout the world. Therefore, the primary objective of the Energy Services negotiations of GATS should be to deregulate the sector by encouraging adoption of the following features of a deregulated market in the sector:
 - Countries should be compelled to relinquish direct and indirect (so called Golden shares) ownership of state energy monopolies. As part of the privatization process, countries must establish a legal and regulatory regime for the energy sector that is transparent, free from undue political influence and that protects the property rights of private owners of businesses operating in the sector. For example, establishing a regulatory regime that requires all decisions to be approved by a Minister or other politically appointed individual does not satisfy the criteria.
 - Countries should be required to unbundled vertically integrated monopolies into separate distribution, transmission and production components. Distribution companies should have the right to purchase supplies (gas, power or services) from any party located inside or outside the countries' borders. Barriers to entry into the production sector should be removed to allow for investment by any firm regardless of origin. Transmission and distribution services should be unbundled for the sale of the commodity such that a party can choose its supplier and contract separately for T&D services with the natural monopoly.
 - The natural monopoly T&D service providers must continue to be regulated by an independent regulatory body capable of establishing non-discriminatory and reasonable terms and conditions of access to the network. The regulatory process must be transparent, timely and efficient. The regulator must be independent.
 - The T&D network owners must reduce or eliminate any conflicts between ownership and operation of the grid and commercial interests in the competitive supply and production sector such that the grid operator does not have the incentive to deny access to its essential facility in order to garner a competitive advantage in supply and production.
 - Both price and non-price barriers (e.g. national security) against imports of energy and services should be eliminated to the maximum extent possible.

(b)(5)

U.S. "Environmental"

http://www.cec.org/programs_projects/other_initiatives/electricity/index.cfm?varlan=english

(b)(5)

Asamoah, Harvetta

From: Carol Balassa [CBALASSA@ustr.gov]
Sent: Thursday, March 15, 2001 10:59 AM
To: Cochran, Pamela; Ekimoff, Lana; Asamoah, Harvetta; David_Downes@ios.doi.gov%internet;
Richard_Boll@ita.doc.gov%internet; sara_hagigh@ita.doc.gov%internet;
WestonST@state.gov%internet; WheelerE@state.gov%internet; jbaumert@usitc.gov%
internet; melly@usitc.gov%internet; R Federal Record
Cc: Joseph Papovich; Peter Collins
Subject: re: Re: Carol's whereabouts

Looks like I may have a family emergency to deal with that will require me to leave for California this afternoon and may prevent me from going to Geneva next week, so if you don't hear from me for a while you will know why.

Once my personal situation is clearer, I'll figure out what to do re a response to the Canadians (which may not be absolutely necessary), so please stand by.

If you need to, I might be reachable at []

Carol

>>> (Christopher Mellv) <mellv@usitc.gov> 03/15/01 07:36AM >>>

Chris

----- Original Text -----

From: "Carol Balassa" <CBALASSA@ustr.gov>, on 3/14/01 4:56 PM:

To: iSMTP@MASTER7@ADP7[<harvetta.asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7[<Lana.ekimoff@hq.doe.gov>], iSMTP@MASTER7@ADP7[<Pamela.cochran@hq.doe.gov>], iSMTP@MASTER7@ADP7[<David_Downes@ios.doi.gov>], iSMTP@MASTER7@ADP7[<Richard_Boll@ita.doc.gov>]

97.

,iSMTP@MASTER7@ADP7[<sara_hagigh@ita.doc.gov>],iSMTP@MASTER7@ADP7[<WestonST@state.gov>],iSMTP@MASTER7@ADP7[<WheelerE@state.gov>],iSMTP@MASTER7@ADP7["R Federal Record" <R@ustr.gov>],Christopher Melly@SI@ID,Jennifer Baumert@SI@ID
Cc: iSMTP@MASTER7@ADP7["Peter Collins"
<COLLINS#032#PETER@ustr.gov>],iSMTP@MASTER7@ADP7["Joseph Papovich"
<PAPOVICH#032#JOSEPH@ustr.gov>]

is attached for your review, comment, and questions by noon tomorrow.

Please hold Friday from 12 to 2:00 free for a possible brown bag lunch meeting to discuss Canada's proposal. Will let you know tomorrow afternoon if such a meeting seems necessary. Have alerted our private sector to the proposal.

If we don't meet on Friday, based on your input, I'll draft talking points and pass them around on Friday for clearance.

Thanks for your understanding on the short turnaround. Carol

Asamoah, Harvetta

From: David_Downes@ios.doi.gov%internet [David_Downes@ios.doi.gov]
Sent: Thursday, March 15, 2001 10:27 AM
To: Asamoah, Harvetta
Cc: Ekimoff, Lana; Cochran, Pamela; 'cbalassa@ustr.gov%internet'; 'cmelly@usitc.gov%internet'; 'jbaumert@usitc.gov%internet'; 'Mcleod.Barbara@epa.gov%internet'; 'Sara Hagigh'
Subject: RE: California Energy Crisis-- GATS

]

(b)(3)

"Asamoah, Harvetta"
<Harvetta.Asamoah@hq.doe.gov>
To: "Sara Hagigh" <Sara_Hagigh@ita.doc.gov>, "Mcleod.Barbara@epa.gov%internet"
03/15/01 07:58 AM <Mcleod.Barbara@epa.gov>, David Downes/PPA/OS/DOI@DOI, "cmelly@usitc.gov%internet" <cmelly@usitc.gov>, "jbaumert@usitc.gov%internet" <jbaumert@usitc.gov>, "cbalassa@ustr.gov%internet" <cbalassa@ustr.gov>, "Ekimoff, Lana" <Lana.Ekimoff@hq.doe.gov>, "Cochran, Pamela" <Pamela.COCHRAN@hq.doe.gov>
cc:
Subject: RE: California Energy Crisis -- GATS
[Virus checked]

](b)(3)

-----Original Message-----

From: Sara Hagigh [mailto:Sara_Hagigh@ita.doc.gov]
Sent: Wednesday, March 14, 2001 5:08 PM
To: Asamoah, Harvetta; Mcleod.Barbara@epa.gov%internet; david_downes@ios.doi.gov%internet; cmelly@usitc.gov%internet; jbaumert@usitc.gov%internet; cbalassa@ustr.gov%internet
Subject: Fwd: California Energy Crisis

](b)(3)

Sara
(See attached file: C.DTF)

98.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, March 15, 2001 8:54 AM
To: 'melly@usitc.gov%internet'; Ekimoff, Lana; Cochran, Pamela; 'CBALASSA@ustr.gov%internet'; 'David_Downes@ios.doi.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'WestonST@state.gov%internet'; 'WheelerE@state.gov%internet'; 'jbaumert@usitc.gov%internet'
Cc: 'JPapovich@ustr.gov%internet'; 'pCOLLINS@ustr.gov%internet'
Subject: RE: Re:Canadian energy (oil and gas) proposal

-----Original Message-----

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Thursday, March 15, 2001 8:17 AM
To: Asamoah, Harvetta; Ekimoff, Lana; Cochran, Pamela; CBALASSA@ustr.gov%internet; David_Downes@ios.doi.gov%internet; Richard_Boll@ita.doc.gov%internet; sara_hagigh@ita.doc.gov%internet; WestonST@state.gov%internet; WheelerE@state.gov%internet; jbaumert@usitc.gov%internet
Cc: JPapovich@ustr.gov%internet; pCOLLINS@ustr.gov%internet
Subject: re: Re:Canadian energy (oil and gas) proposal

(b)(5)

(b)(5)

7(b)(5)
Chris

----- Original Text -----

From: "Carol Balassa" <CBALASSA@ustr.gov>, on 3/14/01 4:56 PM:

To:

iSMTP@MASTER7@ADP7[<harvetta.asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7[<Lana.ekim
off@hq.doe.gov>], iSMTP@MASTER7@ADP7[<Pamela.cochran@hq.doe.gov>], iSMTP@MASTER7@
ADP7[<David_Downes@ios.doi.gov>], iSMTP@MASTER7@ADP7[<Richard_Boll@ita.doc.gov>]
, iSMTP@MASTER7@ADP7[<sara_hagigh@ita.doc.gov>], iSMTP@MASTER7@ADP7[<WestonST@sta
te.gov>], iSMTP@MASTER7@ADP7[<WheelerE@state.gov>], iSMTP@MASTER7@ADP7["R
Federal Record" <R@ustr.gov>], Christopher Melly@SI@ID, Jennifer Baumert@SI@ID

Cc: iSMTP@MASTER7@ADP7["Peter Collins"

<COLLINS#032#PETER@ustr.gov>], iSMTP@MASTER7@ADP7["Joseph Papovich"
<PAPOVICH#032#JOSEPH@ustr.gov>]

is attached for your review, comment, and questions by noon tomorrow.

Please hold Friday from 12 to 2:00 free for a possible brown bag lunch
meeting to discuss Canada's proposal. Will let you know tomorrow afternoon
if such a meeting seems necessary. Have alerted our private sector to the
proposal.

If we don't meet on Friday, based on your input, I'll draft talking points
and pass them around on Friday for clearance.

Thanks for your understanding on the short turnaround. Carol

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, March 15, 2001 7:59 AM
To: Ekimoff, Lana; Cochran, Pamela
Subject: FW: California Energy Crisis -- GATS



Fwd: California Energy
Crisis

-----Original Message-----

From: Sara Hagigh [mailto:Sara_Hagigh@ita.doc.gov]
Sent: Wednesday, March 14, 2001 5:08 PM
To: Asamoah, Harvetta; Mcleod.Barbara@epa.gov%internet;
david_downes@ios.doi.gov%internet; cmelly@usitc.gov%internet;
jbaumert@usitc.gov%internet; cbalassa@ustr.gov%internet
Subject: Fwd: California Energy Crisis

[
Sara

] (b)(5)

Asamoah, Harvetta

From: Lora.Sullivan@enron.com%internet [Lora.Sullivan@enron.com]
To: Tom.Briggs@enron.com%internet; Linda.Robertson@enron.com%internet;
joehillings@aol.com%internet; don.deline@halliburton.com%internet;
tim.richards@corporate.ge.com%internet; Chris.Long@enron.com%internet;
CBCapStrat@aol.com%internet; 75361.622@compuserve.com%internet; -
Lora.Sullivan@enron.com%internet; rcfisher@hillsandco.com%internet;
uta.klinkers@cec.eu.int%internet; vastine@uscsi.org%internet; j@enron.com%internet
Subject: California Energy Crisis

Forwarded at the request of Linda Robertson and Joe Hillings:

California's power crisis has generated heated debate over the last several months. Unfortunately, this debate has generated more heat than light. We want you to know what the facts are and what we are doing about the crisis. Please spend a few minutes reading the following overview on the situation and our position on California energy issues.

What happened in California

The source of California's current problem is as straightforward as supply and demand. California's economy grew 29 percent since 1998. This increased the demand for electricity by 24 percent. At the same time, regulatory restrictions prevented new generation from getting built in the state. So demand grew but regulations prevented supplies from being added. The result, predictably, is a shortage. This summer, peak capacity will be about 10 percent shy of peak demand, leading to further blackouts in the state.

In addition to the supply and demand imbalance, there are two other related factors that led to the current crisis. First, the state's regulations forced all sales and purchases into the spot market. The spot market for power is extraordinarily volatile. The way firms behave in a free market when faced with such volatility is to construct a portfolio of purchases long term, medium term and short term, to reduce exposure to this volatility. In California, state regulation prevented this strategy. This would be the equivalent of putting the entire state on an adjustable rate mortgage in the most volatile interest rate environment imaginable. Everything was fine while the power surplus persisted, but when shortages ensued, every megawatt was purchased at the sky rocketing spot price.

Second, retail markets were not deregulated. Regulated retail rates remained in effect, and stranded cost recovery charges were structured to keep competition out. This meant that utilities were forced to pay high wholesale prices in the spot market but were only able to recover costs at the regulated retail rate. They are now nearly bankrupt.

In short, California's problems were caused by regulation, not deregulation. Regulations prevented competitors from entering the market, prevented new generation from being built, and prevented prudent hedging against volatile spot prices.

At the time California was developing its restructuring plan, Enron warned the state's policy makers about these risks and proposed alternatives, which, if adopted, would have averted the current crisis.

Enron's Role

Many political leaders in the state have elected to fix blame rather than fix the problem. Power sellers, including Enron, have been vilified by the politicians and the media. Here are the facts:

Other than a small amount of wind power, Enron is not a generator in the state of California. Every megawatt we sold in California we bought in the same market available to other California purchasers. Because we are a market maker, not a generator, we are not biased toward high prices. We are interested only in having a market that works so that we can package products for our customers.

As a seller to end-use markets in the state, we provided protection from the problems the states' utilities, and their customers, now face. We protected, and still protect, our customers from price volatility.

You may have read that EES recently elected to have the utilities supply power directly to its customers in California instead of procuring power on the open market. Early reports mischaracterized this as a "turnback" of our customers to the utilities. Here are the facts:

As a result of a variety of factors existing in the current California market, it made more sense for EES to source power for its customers directly from the utilities. This decision reduced EES's market price risk by allowing EES to access lower utility rates.

EES did not terminate any customer contracts, and our customers continue to receive the financial benefits of their contract prices.

EES is continuing to work with its California customers to provide them with other energy-related products and services, including assistance in reducing the demand for power, particularly at peak times.

Enron is currently proposing solutions to help California work out of its crisis; Enron continues to sign up customers in the state; and Enron continues to actively manage its risks and capture opportunities in Western power markets. Enron's primary business is managing risk for our customers with solutions customized to meet their needs. There has never been more demand for our products and services.

The Solution

The solution to California's crisis is also straightforward. In summary, the state must increase supply, reduce demand, reduce reliance on the spot market and shore up the financial stability of the state's utilities.

Increasing Supply

California's process for siting and permitting new generation is nothing short of Byzantine. Enron has built plants elsewhere in the country in less than a year. In California, it often takes 5 to 7 years. California simply must streamline this process. Ironically, while many of the regulations generators must overcome are aimed at improving environmental

quality, the regulations are preventing new clean technology from coming online and displacing current plants, which emit 40 times as much NOx. California can have abundant power and cleaner air by expediting the permitting of new facilities.

Reducing Demand

Customers in California today have no incentive to reduce or shift demand. They pay the same rate no matter what the market price is. An open retail market would trigger demand responses, which would balance supply and demand at lower prices than today. California should fully open its retail market.

Reducing Reliance on the Spot Market

In a truly deregulated market, customers would protect themselves from volatile spot prices by purchasing some of their requirements on a longer term, fixed-price basis. The state has instead left procurement in the hands of the utilities, which it has forced to buy exclusively in the spot market. Opening the market at the retail level will give customers control over their price risk.

Restoring the Financial Integrity of the State's Institutions

The utilities in California are not paying their bills. This has led to greater uncertainty in the market, higher costs, and reduced flexibility to arrive at lasting solutions. California must permit its utilities to recover their costs so they can pay their bills and invest in the transmission and distribution assets necessary to get power from where it is to where it is needed.

Just as important as doing these things, the state must avoid policies that, while politically attractive, do not fix the problem or even make matters worse. Price caps have been proposed. They don't work; have never worked; and they will not work here. Price caps succeed only in creating shortages, which then have to be allocated among competing users. Imagine how ineffectively the government would be in determining, for example, whether it is better to make its limited power supplies available to the Imperial Valley or Silicon Valley. Price caps are a surefire way to make the current shortage worse.

The state has also proposed to take over generation and transmission in California. There is no reason to believe, and every reason to doubt, that the state will be more effective than free markets at investing in, constructing, operating and maintaining assets. This will also result in California tax revenues being spent on power transmission and power generation -- which the private sector can do -- instead of education, roads and other public goods -- which the private sector cannot do.

As you are approached by people outside the company or are learning about the crisis from the media, it's important for you to know this: We at Enron will continue to serve our customers and we will continue to propose real solutions to the state.

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Wednesday, January 31, 2001 10:15 AM
To: 'melly@usitc.gov%internet'
Cc: 'cballassa@ustr.gov%internet'; 'sara_hagigh@ita.doc.gov%internet'; 'Richard_Boll@ita.doc.gov%internet'; 'westonst@state.gov%internet'; 'dudleyj@state.gov'; Pumphrey, David; Brodman, John; Price, Robert S
Subject: Background on Enron's Businesses

Thanks for your articles, Chris. The links are copied below.

Here are two articles on Enron's businesses. The Fortune article is an excellent, interesting article (!). I infer that Enron wants to make sure that its power trading business and natural gas pipeline business can operate in a secure, transparent commercial environment, free (or as free as possible) from political risk and anticompetitive practices by hostile competitors. Enron wants to be able to sell gas and electricity at market-based rates (which can't be done without competitive access to gas and electricity networks and freedom to choose suppliers).

For news articles on Enron, selected by Enron, see: <http://www4.enron.com/corp/pr/inthenews/>

Excerpts from articles below:

Fortune, Re European business: "Not surprisingly, Enron's invasion of Continental Europe in 1997 was greeted by established electric companies about as warmly as advancing bubonic plague. 'They viewed us as Darth Vader,' says Mark Frevert, CEO of Enron Europe. Boards of several power companies passed resolutions forbidding employees to deal with Enron. But the company recognized that it could deal with the balky European utilities if it offered a profitable deal. 'If you go in complaining, expect to be snubbed,' says Joseph Gold, a managing director and one of the few Americans still working in London. 'If you add value, they will do business.' Unlike most government-owned utilities, Enron had the ability to spot and execute deals across national borders. One of Gold's first successes came with a Dutch utility. 'I just asked them to give me a chance to find them cheaper power,' he says. 'About six weeks later I was able to bring power to them from Switzerland.'"

Fortune, Re European businesses: "What exactly does Enron do? In the simplest description, it mostly buys and sells gas and electricity. For instance, when a power company in Kokomo needs electricity to cope with a hot spell in August, Enron can find another utility or private generator with a surplus of power at the right price and arrange to have it sent to Kokomo. The dominant player in gas and electric power trading in the U.S., Enron has branched out abroad and into whole other industries. It has become the largest gas and power trader in Europe, and recently launched innovative trading operations in paper, coal, plastics, and—most intriguing—Internet bandwidth."

Fortune, Re Asian businesses: "Having mastered the U.S. market for gas and power—it sold about 28 billion BTUs of energy per day here last year—Enron has more recently taken its Elvis-through-the-skylight act abroad. It is by far the largest gas and power trader in Europe. In India, it built a \$3 billion power plant and a liquefied-gas terminal south of Bombay—the biggest direct foreign investment in India ever—and spearheaded an overhaul in the way that country does business. Now Enron is eagerly pounding the glass over the ossified and overpriced power industry in Japan."

Fortune, Re UK business: "For all its current success, Enron's initial steps on foreign soil were not entirely surefooted. In one of its first major international forays, in 1990, the company built a huge gas-fired power plant in Teeside, on the northeast coast of England, not far from a number of North Sea gas pipelines. Enron's plans were ambitious and original: Rather than buy

expensive gas from the government monopoly, Enron arranged to get cheaper raw gas right from the pipeline and process it in its own facilities. Alas, it signed agreements to buy vast amounts of gas just as the British government began dismantling its gas monopoly. Gas prices dropped dramatically for just about everyone but Enron, which was stuck with all that uneconomic gas. It cost the company more than a half-billion dollars to get out of its contracts."

Forbes Global: "Outside the U.S., Enron Energy Services expanded into Europe late last year and has high hopes for Japan and South Korea."

Fortune: The Power Merchant

[ENRON, NO. 18] Once a dull-as-methane utility, Enron has grown rich making markets where markets were never made before.

Imagine a country-club dinner dance, with a bunch of old fogies and their wives shuffling around halfheartedly to the not-so-stirring sounds of Guy Lombardo and his All-Tuxedo Orchestra. Suddenly young Elvis comes crashing through the skylight, complete with gold-lame suit, shiny guitar, and gyrating hips. Half the waltzers faint; most of the others get angry or pouty. And a very few decide they like what they hear, tap their feet...start grabbing new partners, and suddenly are rocking to a very different tune.

In the staid world of regulated utilities and energy companies, Enron Corp. is that gate-crashing Elvis. Once a medium-sized player in the stupefyingly soporific gas-pipeline business, Enron in the past decade has become far and away the most vigorous agent of change in its industry, fundamentally altering how billions of dollars' worth of power--both gas and electric--is bought, moved, and sold, everywhere in the nation.

What exactly does Enron do? In the simplest description, it mostly buys and sells gas and electricity. For instance, when a power company in Kokomo needs electricity to cope with a hot spell in August, Enron can find another utility or private generator with a surplus of power at the right price and arrange to have it sent to Kokomo. The dominant player in gas and electric power trading in the U.S., Enron has branched out abroad and into whole other industries. It has become the largest gas and power trader in Europe, and recently launched innovative trading operations in paper, coal, plastics, and--most intriguing--Internet bandwidth.

But saying that Enron trades electricity and gas is like saying that Thomas Edison made records. In most cases, Enron executives didn't just start dabbling in the natural gas and power trading business; they invented the entire concept. Never before had gas and power been traded like commodities. Same with pulp and paper, let alone broadband capacity. "We try to look at markets that don't exist and dream about them existing," says Ken Rice, former head of North American operations who is now in charge of bandwidth trading. "In every case Enron was one of perhaps two companies that thought a market could exist. And every time we'd start, all the established players would say, 'It can't be done. It's not fungible. It can't be stored. What expertise do you bring? The system isn't broken.'"

Wall Street, at least, has learned to take Enron seriously. When the company announced to analysts in January that it was creating a way to trade excess capacity on fiber-optic networks, Merrill Lynch declared Enron a new-economy company. Paine Webber proclaimed it had "one of the deepest and most innovative management teams in the world." (That

opinion is shared by

Enron's peers, who've given it the highest score for innovation of any company on FORTUNE's Most Admired Companies in America survey four years in a row. Enron ranked first this year in quality of management too.) The day after Enron's analyst conference the stock climbed a Nasdaq-like 13 points, and it has doubled in price over the past 12 months. If you think there's nothing you can learn from some old gas-pipeline utility, take a closer look.

One large reason Enron acts unlike any other utility is that the two guys running it, Kenneth Lay and Jeffrey Skilling, act unlike any other utility executives. Ken Lay, the CEO, actually was a pipeline utility exec once, but with a difference. Lay, 58, has a doctorate in economics, and spent years in the 1970s working at what's now the Federal Energy Regulatory Commission, surrounded by lawyers and petroleum engineers. "As an economist, I look at how markets ought to operate," he explains. "I spent a lot of time at FERC arguing for new ways to price gas, and got people thinking differently about markets." Lay, an august and serious fellow, looks like Patrick Stewart, the actor who portrayed Captain Picard in Star Trek (only with more hair and without the British accent).

Lay's second-in-command, president and COO Jeff Skilling, is very different from his boss—a lively, impish character who disdains the huge, serene, high-walled office he occupies atop the Enron building, 40 stories above downtown Houston. "Too quiet. Too removed," he complains. (His kids often play Koosh ball in it and store their racquets in a corner.) He can't wait for Enron's new office tower, under construction across the street, so that he can have an office near the vast new trading floor. "I'll be able to go down a flight of stairs and shoot spitballs at the traders," he jokes.

Skilling, 46, a former McKinsey consultant, was first retained by Enron back in 1985 to help the company spot opportunities created by the early deregulation of the gas business. He found it bizarre at first. "I came from a finance background, and here was a commodity controlled by the federal government." One of the tasks he took on was preaching the benefits of creating a liquid marketplace for trading gas to executives and managers in the gas industry. It wasn't easy. "The engineering mindset prevalent in this business was a roadblock. When we first tried to trade gas, the engineers said, 'Let's see the gas.' It was like trying to do a trade in pork bellies and being asked to see the pigs."

It took a meltdown in the gas and pipeline industries 15 years ago to kick Enron's marketing and trading focus into high gear. At that time, the interstate gas-pipeline industry was a colossal mess, a textbook case of overregulation. An individual pipeline might run from a gas field in Texas or Louisiana all the way up to the northeastern U.S. But by federal law it was a "point to point" system, not a network. Pipelines were permitted to sell gas only to a half-dozen designated gas and electric utilities along their routes. Pipelines couldn't reroute gas to where it was needed, even if there was a January hot spell in New York and a big freeze in Chicago. Pipelines had to buy gas and then resell it at the same price to their utility customers. They could charge for transportation and storage but couldn't jack up the price of the gas to balance supply and demand.

Alas for the pipelines, oil prices started to drop around 1985, and many utilities switched from gas to cheaper oil to fuel their generators. Incredibly, federal rules (issued during shortages a decade earlier) mandated that gas prices had to keep rising

according to some arcane formula. The pipelines, stuck in long-term purchase contracts, couldn't get their customers to take their overpriced gas and couldn't sell it to anyone else.

Lay, who had just become CEO at Enron in 1985 after stints at Transco and Houston Natural Gas, argued to federal regulators that the system had to change. He made little headway. "I told the staff at FERC there was a train wreck coming, but they just didn't get it," says Lay. "Eventually I went directly to the FERC commissioners, and told them the pipelines were going to go belly up." (Scores of pipelines, including Enron, simply walked away from their purchase contracts, triggering years of litigation.) Finally FERC overhauled its regulations, letting utilities shop around and buy gas directly from producers. Pipeline companies were suddenly free as well—to find cheap gas, find customers for it, and ship it to them, even over another company's pipes.

Enron, unlike many more-cautious pipeline companies, viewed the new rules as an opportunity to sell itself to new customers as fast, flexible, and easy to work with. It was willing to carry any gas a utility purchased, or help it procure cheap gas. "The new rules didn't require us to carry other people's gas," says Steven Kean, an Enron executive vice president, "but they didn't prohibit it anymore either. We saw it was the wave of the future, and we jumped on it." Enron execs soon realized that gas buyers at big utilities were unnerved by the rapid fluctuations in deregulated gas prices. Once Skilling and his cohorts sold them on the idea of gas price options and hedges, Enron started packaging and pricing gas in ways that put customers at ease. A utility wanted gas for 30 days at a fixed price? Floating prices, but with a maximum and minimum price? A guaranteed supply of gas whenever the temperature went over 95 degrees? No problem: Enron could slice and dice the gas to a customer's specifications—and in return, of course, could charge a little extra.

Electric power deregulation, which started about seven years ago, hasn't unfolded as quickly as gas deregulation. Each state oversees its own electric utilities, and some states are still dragging their feet. The principles, however, are similar: fewer captive suppliers of the commodity and a lot more bargain hunters looking for juice. In the past, electric utilities operated their own generators and distributed power in their franchise area. Occasionally they would buy from a neighboring utility if a generator was down. But a utility couldn't buy cheap power from far away, because its neighboring utility could refuse to transport it.

Finally, state regulators began requiring utilities to carry anybody else's power, as long as their transmission lines could handle the load. In many cases utilities were ordered to sell off power plants and buy from independent suppliers. Slowly, a "wholesale" market in electric power began to develop. East Coast utilities with high-priced nuclear plants or old, expensive in-city generators started calling coal-fired plants in West Virginia to order electricity for half what it would cost to produce at home.

If anything, Enron jumped into electric power marketing even more aggressively than it went into gas. "Moving slowly on gas was our worst mistake," laments Skilling, "With electricity we didn't do that. We put a huge number of people into it."

And well they did. For if gas has been good to Enron, electric power has been great. Because Enron was already the biggest trader in gas, and because roughly a third of all natural gas is used to fire the boilers in electric power plants, the company found it could strike more complex and daring deals for electricity than the

average power generator could. Maybe Enron agrees to sell a zillion watts of power to Kokomo Electric this summer, confident it has all its sources of supply lined up. But come July it discovers it could sell that power at a higher price to Tuscaloosa Incandescent. Perhaps Enron can persuade Kokomo to take a zillion units of bargain-priced natural gas instead and make its own power. If Kokomo balks, Enron might ask a power plant near Kokomo to take the gas, make electricity, and ship it at a profit to Kokomo.

The company also found that plunging quickly and aggressively into new markets gave it a good shot at outmaneuvering competitors that entered later. The more customers and more suppliers Enron (or any trading company) has, the more options it has in cobbling together a deal. When Enron agrees to provide electric power to a big utility, it may be repackaging power it bought from ten different suppliers under ten different conditions. The more suppliers it has, the more artfully it can pick out a kilowatt here and another one there before putting them on a plate for the customer. Enron traders compare dealmaking to solving jigsaw puzzles--plucking out the kilowatts from its inventory that are configured in ways that fit the customer's needs. The same advantage derives from having more customers than the competition; it means Enron has more places to unload those kilowatts at good prices. Borrowing the language of the Internet (never a bad tongue to speak when Wall Street is listening), Enron claims that being firstest with the mostest gives it the impregnable "first-mover advantage" of an eBay or a Yahoo. That may be a bit grandiose: Enron's U.S. trading volumes are only about 25% ahead of its next competitors--although, to be fair, Enron has held the lead consistently for years.

First mover or not, the leap into gas and electric power trading has paid off spectacularly. Ten years ago Enron earned \$226 million on revenues of \$4.6 billion, mostly from the 30,000 miles of regulated gas pipeline that it still owns. Last year it made \$957 million (\$893 million if nonrecurring items are included) on revenues of \$40.1 billion, and 75% of those earnings came from trading and selling electricity, gas, and other commodities.

The other 25% comes from the old pipeline operations and from some new lines of business that, frankly, prove that Enron management doesn't always walk on water. The company bought an electric utility in Portland, Ore., three years ago, thinking that would help it sell power to residential customers in California. But in 1998, when California unveiled its rules on how electricity would trade there, Enron realized that residential sales would be unprofitable. It is now selling off the utility.

Enron's two-year-old Energy Services division likewise lost \$68 million last year, although it stands to do better in the long run. The division acts as an outsourced manager of lighting, cooling, and electrical power for mid-sized industrial and institutional clients, including the University of California, the Catholic Archdiocese of Chicago, Owens Corning, and Simon Property's 300 shopping malls. Typically, Energy Services agrees to meet a client's gas and electric supply needs for the next ten years for less than the client is paying now. It then uses its network to procure cheaper power and economizes in other ways--say, by replacing old heating, cooling, and lighting equipment with more efficient devices. At an Owens Corning insulation factory, for example, Enron installed new transformers that let the plant get ultra-cheap power from high-voltage lines. Lou Pai, head of Energy Services, says the division signed \$4.8 billion worth of long-term supply contracts in 1998 and \$8 billion worth last year, and expects to sign another \$16 billion this year. Several securities analysts predict that profits, the first green shoots of which appeared in the last quarter of 1999, will climb sharply from here on.

Having mastered the U.S. market for gas and power--it sold about 28 billion BTUs of energy per day here last year--Enron has more recently taken its Elvis-through-the-skylight act abroad. It is by far the largest gas and power trader in Europe. In India, it built a \$3 billion power plant and a liquefied-gas terminal south of Bombay--the biggest direct foreign investment in India ever--and spearheaded an overhaul in the way that country does business. Now Enron is eagerly pounding the glass over the ossified and overpriced power industry in Japan.

For all its current success, Enron's initial steps on foreign soil were not entirely surefooted. In one of its first major international forays, in 1990, the company built a huge gas-fired power plant in Teeside, on the northeast coast of England, not far from a number of North Sea gas pipelines. Enron's plans were ambitious and original: Rather than buy expensive gas from the government monopoly, Enron arranged to get cheaper raw gas right from the pipeline and process it in its own facilities. Alas, it signed agreements to buy vast amounts of gas just as the British government began dismantling its gas monopoly. Gas prices dropped dramatically for just about everyone but Enron, which was stuck with all that uneconomic gas. It cost the company more than a half-billion dollars to get out of its contracts.

Nonetheless, once trading opened up, Enron roared right across England and swept into Continental Europe too. Four years ago Enron Europe had 150 employees. Now it has more than 1,750, including 300 traders, most of them in a spectacular building overlooking Buckingham Palace.

Not surprisingly, Enron's invasion of Continental Europe in 1997 was greeted by established electric companies about as warmly as advancing bubonic plague. "They viewed us as Darth Vader," says Mark Frevert, CEO of Enron Europe. Boards of several power companies passed resolutions forbidding employees to deal with Enron. But the company recognized that it could deal with the balky European utilities if it offered a profitable deal. "If you go in complaining, expect to be snubbed," says Joseph Gold, a managing director and one of the few Americans still working in London. "If you add value, they will do business." Unlike most government-owned utilities, Enron had the ability to spot and execute deals across national borders. One of Gold's first successes came with a Dutch utility. "I just asked them to give me a chance to find them cheaper power," he says. "About six weeks later I was able to bring power to them from Switzerland."

With a broad trading network across the Continent, Enron says it can spot factors influencing future prices sooner than others.

"There's a relationship between the winter snowfall in Scandinavia and the summer price of power in Germany," observes Gold.

Much of Nordic power is hydroelectric, and Swedish transmission lines connect to Denmark and through Denmark to Germany.

Light snowfalls mean less water for hydro plants, and thus less surplus Norwegian and Swedish power for Germany next summer.

Pity the power-trading fool that guaranteed cheap electricity to Frankfurt for next July.

In India, Enron's efforts to build a huge power plant and gas supply system are arguably changing the way the entire country does business. But success came only after Enron was almost brought to its knees by Indian politics.

Enron was warmly greeted in India at first. India produces about as much electric power as Britain, but with a population 15 times bigger, it is woefully underpowered. When Enron agreed in 1992 to build a 740-megawatt power plant in

Dabhol, on the Arabian Sea, about 150 miles south of Bombay, officials were delighted. India, a semisocialist country with historical political ties to the old Soviet Union, has never attracted much direct investment from abroad. Indians disdained foreign capital as an affront to "self-sufficiency" (their 257-year experience with the British East India Co. having been less than entirely satisfying). And the few foreign investors who made their way ashore tended to suffocate under the weight of India's red tape.

Just as the power plant was approved—after years of pushing the plan through ponderous bureaucracies—a new political party won elections in the state of Maharashtra, where Bombay and Dabhol are located. The party came to power in part by whipping up anti-Enron sentiment, and promptly announced the deal was off. Years of political battling ensued. Eventually the new government's hostility softened. It became apparent that nobody else was going to build the plant, that Maharashtra's grandstanding was scaring investors away from all of India, and that Enron's power would be cheaper than any proposed by foreigners hoping to build plants in other states.

Mostly, though, Enron prevailed by sheer tenacity. (None of the 100 power plants proposed for India by other foreign developers in the past decade have been built.) When a series of bomb blasts tied to a religious dispute exploded around Bombay, the hotel where Enron employees were meeting was badly damaged. Enron's guy in charge, Joe Sutton, a former Army Ranger and colonel (and Charlton Heston look-alike) led his employees back to the bombed-out hotel kitchen, where they found barrels of melting ice cream. "We had an ice-cream sundae party to calm everybody down, and went back to work," says Sutton. "The windows in our offices were completely blown out, but we had nowhere else to go." Did the Enron employees think he was crazy to keep working? "Yeah. Probably," shrugs Sutton, now vice chairman. "But we had a lot to do."

Employees were agog at Sutton's drive. "He'd come in to my office at ten at night and announce that we're going down to some government official's office to thrash something out," recall's Wade Cline, now the No. 2 Enron executive in India. "I'd try to tell him that the guy wouldn't be there, but we'd go anyway. Joe would wind up asking the security guards if the official lived nearby, and we'd show up on his doorstep at midnight."

What carried the day, though, was Enron's extraordinary attention to the legal details surrounding its plan. Early on, Enron arranged for any legal disputes to be handled in London, under British law. India didn't have much of an arbitration system in place, and Maharashtra officials at first were surprised, but agreed. As the new state government tried to cancel Dabhol, Enron went to arbitration 27 times and prevailed every time. Says Kirit Parikh, head of a prestigious Indian think tank and an early critic of the deal: "Enron had developed a contract the likes of which had never been seen in India before. It planned for every contingency."

As a direct result, India changed its business laws to allow arbitration of business disputes. Laws governing Indian insurance companies were also amended so that insurers could provide some of the long-term financing the project needed; and restrictive currency controls were relaxed to encourage foreign bankers to finance the project. Eventually the Dabhol plant got built—a sprawling 500-acre village on the hills overlooking the Arabian Sea, complete with rows of worker housing and a 50-bed hospital open to nearby villagers. "People complain that India changed the laws for us, but they changed the laws for everybody," says Sanjay Bhatnagar, a Harvard MBA and now the CEO of Enron India. "People think India is different. But at the

end of the day, the laws of economics are the same here as everywhere."

Enron isn't finished with changing India, by the way. It is building an addition to the Dabhol site that will triple capacity to 2,000 megawatts a day. A billion-dollar liquefied natural gas facility and shipping terminal is rising at Dabhol that will allow LNG to be imported from the Middle East to India for the first time. Enron expects to start building a 300-mile gas pipeline north from Dabhol to Bombay and, later, south to Goa that will bring cheap, clean fuel to India's most industrialized state. Enron hopes dozens of new power plants and industrial customers will spring up alongside the pipelines and even that other pipelines will get built all over India. Enron doesn't particularly want to run the plants and pipelines. But it does want as many competitors as possible. Imagine the trading Enron could be doing in a land where a billion people are consuming gas and electricity.

When every electron and gas molecule in the world has a little ENRON stamped on it, will Enron have run out of trading opportunities? Not likely.

Take Enron's foray into pulp and paper trading. David Cox, a high school dropout and former commercial fisherman, took a menial job at Enron's printing department just to work for the company. (Cox's father, who ran supply boats out to offshore oil rigs, had been outfoxed in a deal by Ken Lay years earlier. His father, impressed, told Junior to find a way to work for the man.) Eventually young Cox got to know Lay and Skilling, and persuaded them that Enron should fund the startup of an outside printing company to handle its publications, with Cox in charge. They agreed, and soon Cox was handling annual reports and other jobs for numerous Houston companies.

When rising paper costs began to cut into profits in 1995, Cox did what any Enron-trained person would: He tried to sign a long-term, fixed-price contract with a supplier. "I found that such contracts didn't exist," says Cox, a burly Cajun from southern Louisiana. "I called up Jeff Skilling and told him, 'Here's a \$175 billion commodity industry, and there are no price-risk management tools.'"

You can figure out the rest. Pulp and paper executives argued that it wasn't needed, that Enron had no experience, and even that investors liked fluctuating paper prices. Cox, until recently the head of Enron paper trading, says he did about \$4 billion in trades last year and expects that figure to double this year. "It's become quite a market," says Frank Dottori, CEO of Tembec, a big Canadian newsprint maker. "It's going to change the industry."

The same kind of serendipity handed Enron what may be its biggest coup: trading in surplus bandwidth on fiber-optic networks. It was triggered when an Enron employee moved from Houston to New York, and Jeff Skilling urged him to set up a video link so that he could stay in touch with traders at headquarters. He discovered that phone companies would provide only a fixed, four-year, \$30,000-per-month video connection, which was far more than he needed. Says Ken Rice, the head of bandwidth trading: "We looked at that and realized it looked just like those long-term, point-to-point gas pipeline contracts from 20 years ago."

Before Enron could start trading, it had some technology homework to perform. Those fiber-optic lines were hard-wired from office to office and couldn't be switched among users unless a technician showed up with

screwdrivers. Enron bought a software company and used it to tweak some Lucent devices, so that spare bandwidth could be switched on 15-minutes' notice. Lo and behold, Enron also had a fiber-optic network to start working on--with capacity it could sell--already built by the electric utility the company owns in Oregon. In January, before a room packed with Wall Street securities analysts, Enron "broke radio silence" on its plans. Any doubts about Enron's ability to pull this off disappeared when Scott McNealy, CEO of Sun Microsystems, stood up and announced that Sun would help build the switched fiber network and that Enron was buying 18,000 Sun routers to make it work. It was like Jesus showing up at a tent revival. Analysts swooned; they cheered; one declared that Enron had "instant credibility" in the new endeavor. When Ken Lay predicted that bandwidth trading would "dwarf" Enron's gas and power trading, analysts ran to tell customers to buy the stock.

Of course, not everybody was so excited. An official at MCI Worldcom, the biggest Internet backbone provider, scoffed. "What possible expertise could Enron have to help in the communications industry?" Hmm. Anyone hear Elvis tuning his guitar?

IT'S ALL NEW BUSINESS

75% of Enron's 1999 profits came from trading and other new businesses, compared with 5% ten years before.

Income from wholesale energy trading

1989 \$226 million 5%

1994 \$453 million 40%

1999 Enron net income:

\$957 million 75%

Other income

FORTUNE CHART/SOURCE: ENRON

Saying Enron trades gas and power is like saying Edison sold records. Enron invented the very concept.

Years ago, Ken Lay outfoxed David Cox's father in a deal. Impressed, Dad told Cox to go work for the man.

Source:

FORTUNE, <http://library.northernlight.com/LH20000411020000279.html?cb=13&sc=0>

#doc

Date:

04/17/2000

New Power Play

Daniel Fisher, Forbes Global, 07.03.00

Electricity deregulation is proceeding rapidly in the U.S., but there are bumps in the road. Two years ago, after heavy spending, Enron pulled the plug on its business of reselling utilities' electricity to residential consumers in California.

One battle doesn't determine a war, however. Instead of giving up, Enron

refined its tactics. The company, which is based in Houston, Texas, refocused on commercial and industrial customers, for which even tiny percentage savings are meaningful. Then Enron looked at all the other ways it could save customers money, from negotiating better rates with utilities to installing more efficient air-conditioning equipment. No longer would Enron be simply a middleman between energy producers and consumers. It would crawl into the physical plants of its customers and take control of every aspect of their energy consumption.

Result? Enron Energy Services, a division created in 1997, expects to sell about \$2.5 billion in electricity and related services this year (about 4% of the parent's expected revenues) and generate a \$75 million profit before interest, depreciation and taxes. Already Enron has captured almost 2% of U.S. commercial and light-industrial demand, with customers that include Chase Manhattan and Polaroid. In California the big utility PG&E Corp. sold its own energy-services business to Enron for \$85 million earlier this year, all but admitting defeat to the infiltrator from Houston.

"This is a constant theme in industries that are deregulated," says Lou L. Pai, 53, who joined Enron in 1987 as it was shaking up the recently deregulated natural gas business and took charge of its infant electricity business six years later. "Somebody can come in with a different cost-structure and essentially beat the pants off you."

Enron's portfolio of long-term contracts has ballooned to \$16 billion, from \$3.8 billion in 1998. The company is winning customers even in such states as Georgia and North Carolina, where utilities still have a monopoly on selling electricity to end users. Outside the U.S., Enron Energy Services expanded into Europe late last year and has high hopes for Japan and South Korea.

The key is a process called "synthetic deregulation," where Enron assumes a customer's obligation to pay the regulated rate for electricity (see box, above). Then Enron guarantees the customer some other price, usually pegged to a regional index, and uses its trading desk to lay off the risk much as a swap dealer exchanges fixed-rate obligations for floating-rate ones. Utilities don't like it, but there's nothing they can do.

(Chris' articles)

Brussels to speed energy market shake-up

The European Commission will shortly propose stricter separation

between energy suppliers and transporters, clearer cross-border tariff

rules and a plugging of grid gaps to achieve a full opening of Europe's

energy market by 2005.

<http://news.ft.com/ft/gx.cgi/ftc?pagename=View&c=Article&cid=FT3ZEF9MKIC&live=t>

rue&tagid=ZZZCWHK1B0C

EEX delays trade in electricity derivatives

European Energy Exchange, the Frankfurt-based electricity trading

market, said on Tuesday it would start trading power derivatives on

March 1, three months later than originally planned.

<http://news.ft.com/ft/gx/cgi/ftc?pagename=View&c=Article&cid=FT3LBDLVLIC&live=t>

rue&tagid=ZZZCWHK1B0C

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Friday, January 19, 2001 4:06 PM
To: 'melly@usitc.gov%internet'; 'jbaumert@usitc.gov%internet'
Subject: FW: Energy Services Ref. paper comments

-----Original Message-----

From: Asamoah, Harvetta
Sent: Friday, January 19, 2001 4:04 PM
To: 'Carol Balassa'
Cc: Pumphrey, David
Subject: RE: Energy Services Ref. paper comments

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Friday, January 19, 2001 1:07 PM
To: Asamoah, Harvetta; melly@usitc.gov%internet; R Federal Record
Cc: jbaumert@usitc.gov%internet; Steve Fabry
Subject: Re: Ref. paper comments

carol
>>> (Christopher Melly) <melly@usitc.gov> 01/19/01 12:03PM >>>

(b)(5)

(b)(5)

(b)(5)

103

Chris

From: Asamoah, Harvetta
Sent: Friday, January 12, 2001 1:54 PM
To: 'melly@usitc.gov%internet'; 'R Federal Record'; 'CBALASSA@ustr.gov%internet'
Cc: Pumphrey, David; Fariello, Theresa
Subject: RE: Mark Warner



106 pages

inches

65

66

From: melly@usitc.gov%internet [mailto:melly@usitc.gov]
Sent: Friday, January 12, 2001 1:14 PM
To: Asamoah, Harvetta; R Federal Record; CBALASSA@ustr.gov%internet
Subject: Re: Mark Warner

6.50

7ay

Chris

----- Original Text -----

From: "Carol Balassa" <CBALASSA@ustr.gov>, on 1/12/01 12:53 PM:
To: iSMTP@MASTER7@ADP7[<Harvetta.Asamoah@hq.doe.gov>], iSMTP@MASTER7@ADP7["R
Federal Record" <R@ustr.gov>], Christopher Melly@SI@ID

(b)(5)

Asamoah, Harvetta

From: David Katz [DKATZ@ustr.gov]
Sent: Tuesday, September 25, 2001 6:11 PM
To: Asamoah, Harvetta; R Federal Record
Subject: RE: Returns in Kind in Singapore FTA

Harvetta,

-David

>>> "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov> 09/25/01 02:14PM >>>
David,

(b)(5)

Harvetta

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 4:45 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa; Steve Fabry; Fran Huegel
Subject: RE: Returns in Kind in Singapore FTA

Harvetta,

(b)(5)

-David

>

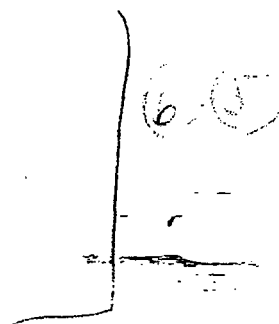
>>> "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov> 09/24/01 01:36PM >>>

(b)(5)

-----Original Message-----

From: David Katz [mailto:DKATZ@ustr.gov]
Sent: Monday, September 24, 2001 1:12 PM
To: Ekimoff, Lana; Asamoah, Harvetta; R Federal Record
Cc: Carol Balassa
Subject:

David Katz
USTR
395-4685



Asamoah, Harvetta

From: Carol Balassa [CBALASSA@ustr.gov]
Sent: Thursday, July 11, 2002 11:14 AM
To: Whit.Warthin@do.treas.gov; Mcleod.Barbara@epa.gov; Harvetta.Asamoah@hq.doc.gov;
Lana.Ekimoff@hq.doc.gov; David_Downes@ios.doi.gov; Richard_Boll@ita.doc.gov;
Greg.Hall@marad.dot.gov; EnisME@state.gov; Richard.Larm@usdoj;
Richard.Larm@usdoj.gov; CMelly@usitc.gov; JBaumert@usitc.gov; Steve Fabry; R Federal
Record
Subject: Enron Talking Points



Enron2.wpd

765

Reminder: Meeting with private sector reps at 1:30 on Monday, July 15, in Room 305 at USTR's main building (600 17th Street, N.W.). Please plan to stay on for interagency meeting from 2:30 to 3:30 p.m. Thnaks. c.

(6)(5)

California Markets Q&A

(b)(5)

Draft 7/11/02 Harvetta Asamoah

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Draft 7/11/02 Harvetta Asamoah

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**Summary of Testimony of Pat Wood, III
Chairman, Federal Energy Regulatory Commission
Before the Subcommittee on Energy Policy,
Natural Resources and Regulatory Affairs
of the Committee on Government Reform
February 22, 2002**

Asamoah, Harvetta

From: Asamoah, Harvetta
Sent: Thursday, July 11, 2002 10:11 AM
To: 'Carol Balassa'
Subject: RE: Draft Talking Points on Enron and California



Enron2.wpd

I have changed the first sentence to:

-----Original Message-----

From: Carol Balassa [mailto:CBALASSA@ustr.gov]
Sent: Wednesday, July 10, 2002 5:40 PM
To: Harvetta.Asamoah@hq.doe.gov; R Federal Record
Subject: Re: Draft Talking Points on Enron and California

>>> "Asamoah, Harvetta" <Harvetta.Asamoah@hq.doe.gov> 07/05/02 11:30AM >>>
Please see attached.

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"Although the Enron memos clearly are very serious, we cannot and should not indict

Draft 7/11/02 Harvetta Asamoah

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Draft 7/11/02 Harvetta Asamoah

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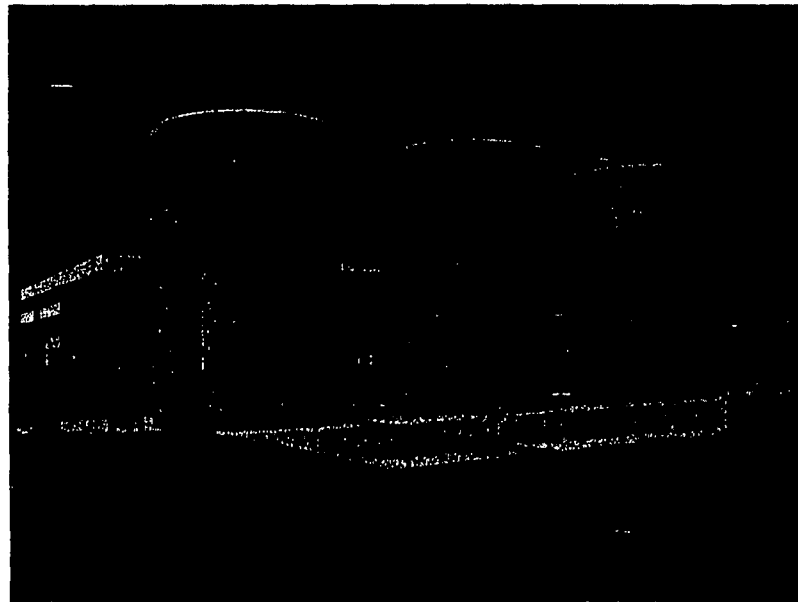
...ing in entity to operate as a mandatory power exchange.

(b)(5)



Portland General Electric

**CONDITIONS FOR USDOE TAKING LEGAL TITLE
OF SNF/HLW AT THE TROJAN NUCLEAR PLANT**





TERMS & CONDITIONS

- PGE, while licensee of the Trojan ISFSI, shall be responsible for implementation of plans for the onsite preparations for shipment of SNF offsite. All expenses incurred to package the SNF/HLW for transportation, and to remove the SNF/HLW offsite shall be considered Allowable Costs.
- The USDOE shall not utilize the Trojan ISFSI to store non-Trojan SNF/HLW.
- In exchange for USDOE's taking title of Trojan SNF/HLW at the agreed upon date, compensation of PGE for the allowable and reasonable costs and fee, and taking possession of the of the Trojan SNF/HLW at the agreed upon date as describe in the proposal, PGE would release USDOE from all claims incurred as a result of USDOE's delay in performance of its disposal obligation for Trojan spent fuel under the Standard Contract.



TERMS & CONDITIONS

65
Upon written request by PGE, USDOE shall make all reasonable efforts to become the title holder, owner, operator and NRC licensee ("take possession") of the Trojan ISFSI and its contents at 2020. (6)(5)

- USDOE and PGE agree in writing to the specific terms and conditions of the physical transfer and responsibilities of the parties for future actions, including, but not limited to:
 - Actions such as transfer of equipment, personnel, and all other activities inherent in the transfer of physical possession and responsibility for operations of the Trojan ISFSI; and
 - The technical and legal description and boundaries of the ISFSI and its contents as well as an environmental baseline; and
 - Each party's responsibility for liabilities that may be incurred subsequent to such transfer of possession; and
 - Fiscal and operational responsibilities of each party for decontamination and decommissioning of the Trojan ISFSI.
- The Trojan ISFSI site shall within two (2) years following removal of all SNF from the Trojan site, be decommissioned, to "unrestricted use" in accordance with 10CFR20.



TERMS & CONDITIONS

- Upon written request by Portland General Electric (PGE), the United States Department of Energy ("USDOE") shall take legal title of all spent nuclear fuel/ high level waste ("SNF/HLW") that is contained in a dual purpose cask system at the Portland General Electric ("PGE") Trojan Nuclear Plant ("Trojan") at 2010 (i.e. five years after the completion of decommissioning which is expected 2005),
- Operating and Maintenance ("O&M") costs of the Trojan ISFSI are considered Allowable Costs upon USDOE taking title of the Trojan ISFSI. USDOE will compensate PGE for all reasonable O&M costs (including regulatory fees for the Part 72 License & Part 71 CofC, insurance, salaries, materials, professional services, power, overheads, fees, taxes, etc.) upon taking title of the Trojan ISFSI, and continue such payments until USDOE takes possession of all Trojan SNF/HLW.
- The USDOE, upon taking title of the spent nuclear fuel, shall in addition to any other O&M cost reimbursements, pay PGE a yearly sum of \$1.7M per year corrected for inflation, until all Trojan SNF/HLW is removed from the site. This value will increase to \$3.4M per year at 2020, \$5.1M per year at 2030, et cetera.



TERMS & CONDITIONS

-
- **PGE will maintain the USNRC 10CFR72 ISFSI license ("License") and state permit until USDOE takes possession of all the Trojan spent fuel.**
 - **PGE or its agent shall maintain current the USNRC 10CFR71, Certificate of Compliance ("Certificate of Compliance") until USDOE takes possession of all the Trojan spent fuel.**
 - **PGE will operate the ISFSI, or contract out its operation if more economical until USDOE takes possession of all the Trojan spent fuel.**



TERMS & CONDITIONS

- The parties agree that the following Removal Allocations are targets only, and do not create any binding legal obligation upon USDOE.
 - Consistent with plans published in the Viability Assessment of a Repository at Yucca Mountain, (DOE/RW-0508), December 1998, USDOE intends to begin repository operations by 2010 and operate the repository with the following target annual acceptance capacity:

• 2010	400 MTUs
• 2011	600 MTUs
• 2012	1,200 MTUs
• 2013	2,000 MTUs
• 2014 and beyond	3,000 MTUs
 - USDOE will allocate Removal Allocations in accordance with the principle of "Oldest Fuel First."



Portland General Electric Company
Trojan Nuclear Plant
71760 Columbia River Hwy
Rainier, OR 97048
(503) 556-3713

September 26, 2000

VPN-043-00

U.S. Department of Energy
DOE Contracting Officer
Office of Placement and Administration
PR-322.2
1000 Independence Avenue, SW
Washington, DC 20585

Submittal of Delivery Commitment Schedule

Portland General Electric Company (PGE) desires, at the very least, to retain its position in the acceptance priority ranking relative to other nuclear utilities. In fact, PGE asks that the U.S. Department of Energy (DOE) consider even earlier acceptance for shutdown plants, which is within DOE's authority under paragraph B.1(b) of Article VI of the Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (DOE Contract No. DE-CR01-83NE44406). PGE does not concede that the rate of acceptance in the latest DOE acceptance priority ranking report (DOE/RW-0457, March 1995) meets DOE's commitments under the contract. To the contrary, PGE protests the low rate of acceptance and the adequacy of the schedule in DOE's acceptance priority ranking.

With these qualifications, in order to protect its priority relative to other nuclear utilities, PGE submits in accordance with paragraph B.1 of Article V of the contract a completed Delivery Commitment Schedule for PGE's Year 9 allocation of projected waste management system acceptance capacity. Please note that the information is being submitted on a form that expired July 31, 2000, since current forms have not yet been printed. This status on availability of current forms was confirmed by Thomas Pollog, of the DOE Waste Acceptance and Transportation Division of the Office of Civilian Radioactive Waste Management (RW-44), in a telephone conversation with Lanny Dusek of my staff on September 20, 2000. Questions concerning this submittal may be directed to Jerry Cooper of my staff at (503) 556-7418.

Sincerely,

Stephen M. Quennoz
Vice President, Nuclear
and Thermal Operations

Enclosure



Washington, DC 20585

Office of General Counsel
For Litigation (GC-30, 32)

FACSIMILE TRANSMISSION FORM

Facsimile from:

John Tabor
Forrestal Building, Room 6H087
1000 Independence Avenue, SW
Washington, DC 20585

Phone: 202-586-5414 or 586-8701

Facsimile: 202-586-3437 or 586-3274

To: *Mike Henke*

Facsimile number(s): *639-6604*

Date: *10/25/00*

Pages: *2* (including cover page)

Message:

PGE Allocation

This facsimile is intended only for the use of the recipient(s) to whom it is addressed and may contain information that is privileged and confidential. If you are not the intended recipient (or a person responsible for delivering this to the intended recipient), you are hereby notified that any disclosure, distribution or copying of this information is strictly prohibited. If you have received this facsimile in error, please notify Marc Johnston at 202-586-2909. Thank you.



Printed with soy ink on recycled paper

110.

Vinson & Elkins

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VINSON & ELKINS LLP

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FAX (202) 639-6604

Writer's Phone 202/639 6529

Writer's Fax 202/670 8820

E-Mail: mjhenke@v-el.comWeb: www.v-el.com

May 30, 2001

Via Federal Express

The Honorable Denise L. Cote
 United States District Court
 Southern District of New York
 500 Pearl Street, Room 1040
 New York, New York 10007

Re: In re Uranium Decontamination & Decommissioning Fund Litigation,
 98 Civ. 4155 (DLC); 00 Civ. 1424 (DLC); 00 Civ. 1425 (DLC); and
 00 Civ. 1426 (DLC)

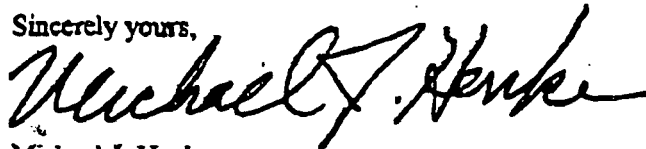
Dear Judge Cote:

I write on behalf of my clients, Portland General Electric Company ("PGE") and the City of Eugene, Oregon, acting by and through the Eugene Water and Electric Board ("EWEB"), in response to the May 29, 2001 letter from Lori Van Auker.

While PGE and EWEB agree with and support most of Ms. Van Auker's letter, we respectfully disagree with the suggestion in Part B-2 that this Court lacks power to initiate termination of the MDL proceeding. Rule 7.6(c)(ii) of the Multidistrict Rules specifically empowers the Multidistrict Panel to remand a transferred action "at or before the conclusion of coordinated or consolidated pretrial proceedings on . . . suggestion of the transferee district court." Thus, the rules explicitly contemplate the possibility of remand even before conclusion of pretrial proceedings on suggestion of the transferee court.

PGE and EWEB opposed transfer of their case from the United States District Court for the District of Columbia pursuant to the MDL procedures. See Attachment A. Thus, PGE and EWEB would have no objection to a suggestion by this Court that the MDL Panel remand their case to the district court in which it was initially filed.

Sincerely yours,



Michael J. Henke
 Counsel for Portland General Electric Company
 and the City of Eugene, Oregon

Attachment

c: Lori Van Auker
 Sheila M. Gowan
 Howard N. Cayne
 Eric J. Marcotte

[Via Facsimile]

144444_1.DOC

111.



Portland General Electric Company
Trojan Nuclear Plant
71760 Columbia River Hwy
Rainier OR 97048
(503) 556-3713

November 3, 1998.-

VPN-070-98

Edwin M. Marshall
U.S. Department of Energy
Oak Ridge Operations
PO Box 5385
Oak Ridge, TN 37831

Dear Mr. Marshall: -

Special Assessment Provisional Invoice Number D990033

We have forwarded by wire the payment of Portland General Electric Company (PGE) in response to the captioned special assessment invoice. This payment is made under protest with full reservation of all rights to challenge the validity of the assessment and to seek a refund of the entire amount of the payment, plus interest as allowed by law. Payment of the special assessment does not mean that PGE agrees with the amount of the special assessment or that any amount is due. Payment does not constitute a waiver of any action allowable under law to recover a full refund.

On or about May 5, 1997, PGE filed a lawsuit in the United States Court of Federal Claims, captioned PGE, et al. v. United States of America, Case No. 97-322C. On October 19, 1998, PGE filed its First Amended Complaint in that case seeking reimbursement of \$10,920,105.96 in special assessments that have already been paid to the Department of Energy (DOE). On October 22, 1998, PGE filed a parallel lawsuit in the United States District Court for the District of Columbia, captioned PGE, et al. v. United States of America, Case No. 98-cv-2552, seeking declaratory and injunctive relief against future special assessments. PGE entered into fixed-priced contracts with the United States to obtain uranium enrichment services. DOE's special assessment, based on prior purchases of such services, constitutes an improper and unlawful retroactive adjustment to the price of the underlying contracts, an unlawful taking without just compensation, and a violation of PGE's rights under the due process clause of the Fifth Amendment to the United States Constitution. PGE reserves its rights to claim a full refund.

Sincerely,

Stephen Manning

Stephen M. Quennoz
Vice President Nuclear
and Thermal Operations

c: J. C. Cooper
D. Outama
D. R. Nichols
Kevin Kiely, Esq.

Connecting People, Power and Possibilities



112.

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

PORTLAND GENERAL ELECTRIC
COMPANY. et al.

Plaintiffs,

v.

UNITED STATES OF AMERICA, et al.

Defendants.

Civil Action No. 98-2552 (WBB)

**MEMORANDUM OF POINTS AND AUTHORITIES IN OPPOSITION
TO THE GOVERNMENT'S MOTION TO TRANSFER, OR, IN THE
ALTERNATIVE, TO DISMISS FOR LACK OF JURISDICTION**

Of Counsel:

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Portland, Oregon 97204
Telephone: (503) 464-8861

G. Kevin Kiely
Cable Huston Benedict Haagensen
& Lloyd, LLP
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Vinson & Elkins L.L.P.
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Counsel for Plaintiffs

March 12, 1999

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**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

PORTLAND GENERAL ELECTRIC
COMPANY, et al.

Plaintiffs.

v.

UNITED STATES OF AMERICA, et al.

Defendants.

Civil Action No. 98-2552 (WBB)

**MEMORANDUM OF POINTS AND AUTHORITIES IN OPPOSITION
TO THE GOVERNMENT'S MOTION TO TRANSFER, OR, IN THE
ALTERNATIVE, TO DISMISS FOR LACK OF JURISDICTION**

I. INTRODUCTION

Plaintiffs, Portland General Electric Company ("PGE") and the City of Eugene, Oregon, acting by and through the Eugene Water and Electric Board ("EWEB") (collectively "PGE"), respectfully submit the following memorandum of law in opposition to the Government's¹ motion to transfer this action to the U.S. Court of Federal Claims ("CFC") pursuant to 28 U.S.C. § 1631 or to dismiss for lack of subject matter jurisdiction pursuant to Fed. R. Civ. P. 12(b)(1). The Government asserts that this Court lacks subject matter jurisdiction because there has been no waiver of sovereign immunity for PGE's constitutional takings and due process claims seeking declaratory and injunctive relief. In its view, transfer to the CFC is therefore appropriate.

The Government's motion is without merit and should be denied. Section 702 of the Administrative Procedure Act ("APA"), 5 U.S.C. § 702, waives sovereign immunity in this Court

¹Collectively referred to herein as the "Government." Defendants are the United States of America and the United States Department of Energy ("DOE"), individually and as successor to the United States Atomic Energy Commission ("AEC") and the Energy Research and Development Administration ("ERDA").

for such claims according to clear District of Columbia Circuit precedent, see Transohio Sav. Bank v. Director, OTS, 967 F.2d 598 (D.C. Cir. 1992); Sharp v. Weinberger, 798 F.2d 1521 (D.C. Cir. 1986).

As described in greater detail below, PGE brings a constitutional challenge under the Takings and Due Process Clauses to certain provisions of the Energy Policy Act of 1992 ("EPACT"), 42 U.S.C. §§ 2297g et seq. and its implementing regulations, 10 C.F.R. §§ 766.1 et seq. ("Special Assessment Statutes"). These provisions, inter alia, imposed a "special assessment" on domestic utility companies, including PGE, to fund decontamination and decommissioning ("D&D") costs associated with the cleanup of the Government's uranium enrichment facilities. Those facilities were polluted through nuclear weapons manufacturing, which benefitted the public at large. Nevertheless, the Special Assessment Statutes require certain domestic (but not foreign) utilities which purchased uranium enrichment services from the DOE, through fixed-price contracts, to foot the D&D bill by paying special assessments based on those long-past and completed transactions. In some instances, special assessments have been levied on the basis of transactions going back decades. PGE has already paid over \$10 million in special assessments; if future assessments are not enjoined, it will pay approximately \$15 million more.² The present action seeks a declaration that the special assessments unconstitutionally take PGE's property without just compensation and deprive it of its property without due process of law, and an injunction against further assessments. PGE

²PGE has brought a separate action in the CFC, styled Portland Gen. Elec. Co. et al. v. United States (No. 97-323C) to recover the previously-paid special assessments. This action has been stayed pending the outcome of this action, or a series of similar cases filed by other affected domestic utilities in the CFC and the U.S. District Court for the Southern District of New York. See Arizona Pub. Serv. Co. et al. v. United States, Nos. 96-654C, 96-702, 97-18, 98-615 (consolidated) (CFC order filed Feb. 4, 1999); Portland Gen. Elec. Co. et al. v. United States, No. 97-322C (CFC order filed Feb. 4, 1999); Consolidated Edison Co. of New York et al. v. United States, No. 98-4155 (S.D.N.Y.).

relies upon the theories recently espoused by the plurality and concurring opinions of the Supreme Court in Eastern Enters. v. Apfel, ___ U.S. ___, 118 S. Ct. 2131 (1998) (holding that a statute retroactively imposing pension liabilities on coal operators based on decades-old labor contracts was unconstitutional).

The Government argues that this Court lacks jurisdiction under the APA over this dispute and seeks a transfer to the CFC under 28 U.S.C. § 1631 where, it claims, the Tucker Act, 28 U.S.C. § 1491(a)(1) ("Tucker Act"), provides the only applicable waiver of sovereign immunity. The Government contends the APA does not supply the necessary waiver for the following reasons: (1) the Tucker Act impliedly forbids the relief sought as this action is a disguised contract claim for which relief is available only in the CFC, and PGE's takings claim is premature until "just compensation" is sought in the CFC (Gov't Mem. at 6-12); (2) PGE essentially seeks "money damages" which are unavailable under the APA (id. at 12-15); and (3) PGE's CFC action, seeking return of previously-paid special assessments, would provide an adequate remedy, thereby precluding APA review (id. at 15-18).

The short answer to the Government's argument is provided by two recent decisions of the D.C. Circuit that govern this case. See Transohio, supra; Student Loan Mktg. Ass'n v. Riley, 104 F.3d 397 (D.C. Cir.), cert. denied, 118 S. Ct. 295 (1997). Transohio squarely holds that this Court has jurisdiction under the APA over due process challenges to federal statutes, even where such challenges implicate, or depend on resolution of, contractual issues. 967 F.2d at 609-11; see also Sharp, 798 F.2d at 1521-24. Student Loan Mktg. Ass'n holds that this Court may entertain a takings claim challenging a statute mandating a "direct transfer of funds" to the Government, even before just compensation has been denied by the CFC. 104 F.3d at 401-402; see also Eastern Enters., 118

S. Ct. at 2144-46; In re Chateaugay Corp., 53 F.3d 478, 493 (2d Cir.), cert. denied, 516 U.S. 913 (1995).

Furthermore, this action does not seek "money damages" but rather the equitable remedies of a declaratory judgment and an injunction, which the CFC cannot grant. The Court's award of PGE's requested relief would preclude the Government from collecting further special assessments but would not directly result in the payment of money by the Government. Under Bowen v. Massachusetts, 487 U.S. 879 (1988) and its progeny, this Court has ample authority to award the relief requested.

Indeed, in circumstances remarkably similar to the present case, this Court recently held that it had subject matter jurisdiction over a government contractor's constitutional claims against a federal agency, even though those claims were closely related to their contractual relationship. Ervin and Assocs. Inc. v. Dunlap, No. 96-CA-1253 (WBB), 1997 WL 1067754, at *8-*10 (D.D.C. Feb. 14, 1997) (Bryant, J.) (copy attached as Exhibit 1). The Government has repeated here essentially the same tired arguments that were rejected by this Court in Ervin. This Court should similarly reject those arguments here and deny the Government's motion.

II. FACTUAL AND PROCEDURAL BACKGROUND

Plaintiffs jointly owned and operated a nuclear reactor for the purpose of generating and supplying electricity for residential and commercial use in various states of the United States. (Compl. at ¶ 3). From 1972 until 1984, PGE entered into a series of fixed-price commercial contracts with the Government for the latter to provide uranium enrichment services necessary for the operation of PGE's reactor. (Id. at ¶¶ 39-44). During that period, the Government was the principal supplier of uranium enrichment services, not only to PGE, but also to the domestic utility

industry in general. (Id. at ¶¶ 5-11).³ The standard form contracts through which PGE acquired uranium enrichment services established a "ceiling charge," which, by statute, was set to ensure that the Government recovered all of the costs of uranium enrichment. (Id. at ¶¶ 7-9); see also 28 U.S.C. § 2201v (1970). On or about October 1, 1984, PGE entered into a Supplemental Agreement of Settlement with the Government, which terminated the prior contracts and stated explicitly that PGE's contractual obligations to the Government were concluded. (Compl. at ¶ 44).

Between October 1, 1984, and the formal shutdown of the plant in January 1993 (id. at ¶ 20), Trojan Nuclear Power Plant purchased enrichment services from DOE pursuant to a Utility Services Contract executed in October 1984. (Id. at ¶ 39). The pricing provisions of the 1984 contract were essentially similar to the earlier contracts, including specification of a ceiling price. Moreover, the 1984 contract provided that price could not be exceeded without ten years' advance written notice. (Id. at ¶ 47). An April 19, 1993 Supplemental Agreement of Settlement explicitly provided that all of PGE's obligations under the contract were terminated. (Id. at ¶ 48).

Beginning in the mid-1980s, the Government's near-monopoly on uranium enrichment services was broken when foreign suppliers emerged, creating stiff competition. (Id. at ¶ 11). At about the same time, the Government learned that its D&D costs could reach several billions of dollars. (Id. at ¶ 12). To resolve the looming crisis, Congress enacted the Special Assessment Statutes, designed to restore the Government's commercial enrichment business to financial health and to fund the mounting D&D costs. (Id. at ¶ 13). The previously-referenced special assessment

³The Government's uranium enrichment program was not undertaken primarily to benefit the domestic utility industry. The Government had been enriching uranium for manufacturing nuclear weapons since the 1940s. (Compl. at ¶ 31). Between 1945 and 1970, on information and belief, approximately 96 percent of the enriched uranium produced by the Government was used for national defense purposes (id. at ¶ 32), and the contamination was substantially caused by such defense activities (id. at ¶ 35).

scheme addressed the D&D crisis by requiring domestic (but not foreign) utilities that purchased uranium enrichment services from the Government at any time prior to 1992 to pay \$150 million per year for a total of \$2.25 billion over fifteen years. (*Id.* at ¶ 14).⁴ Each utility's share of the special assessment is calculated based on the quantity of uranium enrichment services it purchased. (*Id.*). As of October 22, 1998, when this action was filed, PGE had paid \$10,920,105.96 in special assessments. (*Id.* at ¶ 15). Should the Court not enjoin future special assessments, PGE will pay approximately \$15 million more over the next eight years. (*Id.*).

This Action, consisting of five counts, was filed on October 22, 1998. In Count I, PGE alleges that the special assessments constitute an unlawful taking of PGE's property without just compensation. (*Id.* at ¶¶ 83-95). The special assessments unilaterally increase the price charged for uranium enrichment services. (*Id.* at ¶¶ 83-86). In doing so, the special assessments upset PGE's reasonable investment-backed expectations, deprive PGE of its property for a generally public benefit, and require PGE to fund liabilities (*i.e.*, D&D costs) over which it had no control and for which it should have no responsibility. (*Id.* at ¶¶ 81-95). By imposing such a severe, unforeseen, and unreasonable retroactive liability based on fully-performed contracts, the Government has unconstitutionally taken PGE's property (*i.e.*, its vested property interest in the economic benefits stemming from the fully-performed contracts). It has also unconstitutionally taken the funds necessary to pay the special assessment. (*Id.* at ¶¶ 90-95). PGE therefore seeks a declaratory judgment that the Special Assessment Statutes violate the Takings Clause of the Fifth Amendment. (*Id.* at ¶ 95).

⁴The Government also would fund a portion of the D&D costs out of general appropriations. (Compl. at ¶ 74).

In Count II, PGE alleges for similar reasons that the Special Assessment Statutes violate the Due Process Clause of the Fifth Amendment and seeks a declaratory judgment to that effect. (*Id.* at ¶¶ 96-105). The Special Assessment Statutes impose an unfair, harsh, and severely retroactive liability based on transactions that occurred long ago. (*Id.* at ¶ 98). The statutes further target an exceedingly narrow group of utilities which are without responsibility for the underlying D&D costs in order to confer a general benefit on the public at large. (*Id.* at ¶¶ 100-105). Accordingly, the Special Assessment Statutes are irrational and arbitrary, and, therefore, unconstitutional under the Fifth Amendment's Due Process Clause.

In addition to the takings and due process claims, PGE alleges that the Special Assessment Statutes unlawfully impair both PGE's fixed price contracts (Count III, Compl. at ¶¶ 106-11) and its supplemental settlement agreements with the Government (Count IV, Compl. at ¶¶ 112-16). These latter claims are variations on the constitutional theme, alleging that the statutes should be invalidated as they impair contracts and agreements that were fully performed.⁵ Finally, Count V seeks an injunction restraining the Government from collecting any future special assessments and from taking any and all action to enforce the Special Assessment Statutes. (Count V, Compl. at ¶ 121).

⁵Although Counts III and IV do not explicitly refer to the Due Process Clause, the allegations rely upon principles of fundamental fairness that Congress ought not to be permitted to impair completed contracts through imposition of a severely retroactive, irrational and arbitrary liability. The theory is not dissimilar to the prohibition against state impairment of contracts under the Contract Clause of the Constitution. *See* U.S. Const. art. I, § 10, cl. 1. Although the Contract Clause is not applicable to the federal government, the Due Process Clause restricts the Government's ability to legislate so as to impair private obligations. *Cf. Pension Benefit Guar. Corp. v. R.A. Gray & Co.*, 467 U.S. 717, 732-33 (1984). Accordingly, contrary to the Government's assertion (Gov't Mem. at 1), we believe Counts III and IV are not "breach of contract" claims but allege additional bases for holding the Special Assessment Statutes unconstitutional as violative of due process. Should the Court disagree, however, PGE is amenable to the dismissal of Counts III and IV.

As previously indicated, PGE also has filed an action in the CFC seeking a refund of special assessments already paid. See Portland Gen. Elec. Co. et al. v. United States (No. 97-322C).⁶ Although the Government contends that the CFC action would provide adequate relief, that action seeks only the return of money previously paid and would offer no protection against the imposition of future assessments. Indeed, the CFC action was filed, in part, to preserve PGE's ability to seek compensation for previously-paid special assessments in the event that this Court finds the statute to be unconstitutional. However, PGE may obtain full relief only through both actions: a declaration of unconstitutionality and prospective relief in this Court followed by compensatory relief for past payments from the CFC. Neither court may provide full relief alone. In part recognizing this concern, the CFC stayed that action pending the judgment in this Court, or in certain similar cases pending in the CFC and in the U.S. District Court for the Southern District of New York. See Arizona Pub. Serv. Co. et al. v. United States, Nos. 96-654C, 96-702, 97-18, 98-615 (consolidated) (CFC order filed Feb. 4, 1999); Portland Gen. Elec. Co. et al. v. United States, No. 97-322C, (CFC order filed Feb. 4, 1999); Consolidated Edison Co. of New York et al. v. United States, No. 98-4155 (S.D.N.Y.).

III. ARGUMENT

As then-Judge Scalia observed, "[i]f there is a less profitable expenditure of the time and resources of federal courts and federal litigants than resolving a threshold issue of which particular federal court should have jurisdiction, it does not come readily to mind." Sharp, 798 F.2d at 1522. Nonetheless, in order to preserve its claim to prospective relief enjoining enforcement of an

⁶More than twenty similar actions have been filed in the CFC by other affected utilities. See, e.g., Arizona Pub. Serv. Co. et al. v. United States, (Nos. 96-654C, 96-702, 97-18, 98-615 (consolidated)).

unconstitutional statute, PGE must fend off the Government's meritless attempt to divest this Court of its clear jurisdiction. Distilled to essentials, the Government's basic argument is that sovereign immunity precludes this Court from holding a federal statute unconstitutional and enjoining its enforcement. Although the CFC cannot provide the prospective relief PGE seeks here, the Government maintains that the CFC is the only proper forum for this action. In its view, the Tucker Act gives the CFC exclusive jurisdiction over contract claims against the Government and over takings claims for just compensation (i.e., money damages).

This action is neither a contract claim nor a claim for just compensation. Rather, it is a constitutional challenge to the Special Assessment Statutes seeking equitable relief. Thus, it is the quintessential type of action heard, and seeks relief routinely provided by, federal district courts acting pursuant to the APA. See Eastern Enters., 118 S. Ct. at 2144-46; Student Loan Mktg. Ass'n, 104 F.3d at 401-02; Transohio, 967 F.2d at 607-11; Esch v. Yeutter, 876 F.2d 976, 982-85 (D.C. Cir. 1989); Sharp, 798 F.2d at 1523; Ervin and Assocs., 1997 WL 1067754, at *8-*10; Americable Int'l, Inc. v. United States Dep't of Navy, 931 F. Supp. 1, 2 (D.D.C. 1996). Cases cited by the Government either are distinguishable, as they do not involve constitutional claims, or fail to follow the precepts of Transohio and Student Loan Mktg. Ass'n explained below. Because Transohio and Student Loan Mktg. Ass'n state the law in this Court, the Government's motion should be denied.

A. Subject Matter Jurisdiction is Proper Under the Court's Federal Question Jurisdiction, Where Sovereign Immunity Has Been Waived

The Government's opening argument is that the federal question jurisdictional statute, 28 U.S.C. § 1331, the mandamus statute, 28 U.S.C. § 1361, and the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202, do not waive sovereign immunity and therefore "can easily [be] dispose[d] of" here. (Gov't Mem. at 4-5). The point is irrelevant. Because sovereign immunity has been

waived under APA § 702, the above-cited statutes simply provide the basis for the Court's exercise of subject matter jurisdiction.⁷ "Under settled law, for claims permitted under the APA's waiver of sovereign immunity, jurisdiction is proper in the federal district court under the federal-question statute[,] the declaratory-judgment statute[,] or the mandamus statute[.]" Transohio, 967 F.2d at 607 (internal statutory citations omitted); see also Bowen, 487 U.S. at 891 n.16 ("It is common ground that if review is proper under the APA, the District Court had jurisdiction under 28 U.S.C. § 1331"); Sharp, 798 F.2d at 1523 ("[I]t is clear that [APA] § 702 now constitutes a waiver of sovereign immunity from such nonmonetary suits, and that district courts have jurisdiction over them under" the general federal question, mandamus, and declaratory judgment statutes). Because the APA clearly provides a waiver of sovereign immunity in this case, as described below, this Court has jurisdiction under 28 U.S.C. §§ 1331, 1361, 2201-2202.⁸

⁷In any event, an explicit waiver of sovereign immunity is not necessary because this suit seeks to enjoin a federal agency from acting unconstitutionally and therefore ultra vires. Larson v. Domestic & Foreign Commerce Corp., 337 U.S. 682, 689-90 (1949). "It is well-established that sovereign immunity does not bar suits for specific relief against government officials where the challenged actions of the officials are alleged to be unconstitutional or beyond statutory authority." Clark v. Library of Congress, 750 F.2d 89, 102 (D.C. Cir. 1984); see also Kelley v. United States, 69 F.3d 1503, 1507 (10th Cir. 1995) ("[O]ne of the well-established exceptions to the [sovereign immunity] doctrine limits its application in declaratory and/or injunctive suits against federal entities or officials seeking to enjoin the enforcement of an unconstitutional statute."), cert. denied, 517 U.S. 1166 (1996); Owner-Operator Indep. Drivers Ass'n Inc. v. Pena, 862 F. Supp. 470, 474 (D.D.C. 1993) ("Sovereign immunity will not bar an action against a federal officer who was acting within the scope of his authority if it is claimed, as it is in this case, that the statute upon which his or her actions were based is unconstitutional.").

⁸The Government does not dispute that, absent the sovereign immunity issue, this Court would have subject matter jurisdiction over constitutional takings and due process claims. See Eastern Enters., 118 S. Ct. at 2144-45 (takings claim); Duke Power Co. v. Carolina Envtl. Study Grp., Inc., 438 U.S. 59, 68-72 (1978) (due process claim).

B. The APA Waives Sovereign Immunity Over This Action Which Seeks Review of Unlawful Agency Action and Non-Monetary Relief

The APA explicitly "waive[s] sovereign immunity for suits seeking relief other than money damages from federal agencies or officials." Transohio, 967 F.2d at 607. Nevertheless, the Government argues that the APA's waiver of sovereign immunity does not apply here, because (1) this action seeks the equivalent of money damages, (2) another statute, the Tucker Act, impliedly forbids the relief sought; and (3) the CFC may provide an adequate remedy. (Gov't Mem. at 5-18). These arguments simply ignore established Supreme Court and D.C. Circuit precedent, holding that a district court, not the CFC, is the proper forum for seeking declaratory and injunctive relief against a federal agency alleged to be acting pursuant to an unconstitutional statute. As Eastern Enters., Bowen, Student Loan Mktg. Ass'n, Transohio, and Sharp demonstrate, the APA permits this Court to consider PGE's constitutional claims.

The key provision, APA § 702, provides in pertinent part:

A person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action . . . is entitled to judicial review thereof. An action in a court of the United States seeking relief other than money damages and stating a claim that an agency . . . acted or failed to act in an official capacity or under color of legal authority shall not be dismissed nor relief therein be denied on the ground that it is against the United States or that the United States is an indispensable party. . . . Nothing herein (1) affects other limitations on judicial review or the power or duty of the court to dismiss any action or deny relief on any other appropriate legal or equitable ground; or (2) confers authority to grant relief if any other statute that grants consent to suit expressly or impliedly forbids the relief which is sought.

5 U.S.C. § 702.⁹ The operative language (underlined above) was added by Congress in 1976 to "broaden the avenues for judicial review of agency action by eliminating the defense of sovereign immunity in cases covered by the amendment." Bowen, 487 U.S. at 891-92.¹⁰ Although waivers of sovereign immunity generally are strictly construed (Gov't Mem. at 3), the APA's "generous review provisions must be given a hospitable interpretation" in order to effectuate their purpose "to remove obstacles to judicial review." Bowen, 487 U.S. at 904 (internal citations and quotation marks omitted).

C. None of the Exceptions to the APA's Waiver of Sovereign Immunity Applies Here

APA § 702 thus provides for judicial review in this Court of unlawful agency action unless PGE's claims fall within any of three limitations. "The APA excludes from its waiver of sovereign immunity (1) claims for money damages, (2) claims for which an adequate remedy is available elsewhere, and (3) claims seeking relief expressly or impliedly forbidden by another statute." Transohio, 967 F.2d at 607. Notwithstanding the Government's contrary assertions, none of these exceptions applies in this case.

⁹The Government also relies upon APA § 704, which provides in pertinent part: "Agency action made reviewable by statute and final agency action for which there is no other adequate remedy in a court are subject to judicial review." 5 U.S.C. § 704. As demonstrated in the following text, the APA applies here because the equitable relief sought -- the only "adequate remedy" -- is not available in the CFC.

¹⁰See Pub. L. No. 94-574, § 1, 90 Stat. 2721 (1976). The legislative history confirms this intent. See H.R. Rep. No. 94-1656, at 3 (1976), reprinted in 1976 U.S.C.C.A.N. 6121, 6123 (stating amendment designed to "eliminate the defense of sovereign immunity as to any action in a Federal court seeking relief other than money damages and stating a claim based on the assertion of unlawful official action by an agency").

1. PGE Seeks Injunctive and Declaratory Relief, Not Money Damages

The Government asserts that PGE's claims for declaratory and injunctive relief, "albeit characterized as equitable, [are] in fact the equivalent of 'money damages.'" (Gov't Mem. at 12). PGE's Complaint, however, makes no demand for -- indeed, does not even refer to -- money damages or any other form of monetary relief. Rather, PGE seeks in this action ~~only prospective~~ relief declaring the Special Assessment Statutes unconstitutional and enjoining future assessments. (Compl. at ¶¶ 29-30). The Government's attempt to warp PGE's claims into a demand for money damages not only is refuted by the Complaint but also directly contradicts Bowen and its progeny.

In Bowen, the Court held that a district court properly exercised jurisdiction under the APA over a challenge by Massachusetts to a decision by the Secretary of Health and Human Services relating to payments allegedly due the Commonwealth under the Medicaid program. Massachusetts sought declaratory and injunctive relief that a certain class of expenses were properly reimbursable under the Medicaid statute. 487 U.S. at 883-89. As in this case, the Government argued that Massachusetts essentially sought monetary relief -- albeit through the equitable remedies of a declaratory judgment and an injunction -- and that the APA therefore did not authorize district court jurisdiction. Id. at 890-91. Rejecting the Government's narrow view of the APA, the Court held that "insofar as the complaints sought declaratory and injunctive relief, they were certainly not actions for money damages." Id. at 893. Even if granting the requested relief would result in the payment of money, the Court held that such monetary relief did not constitute "money damages" under the APA. Id. at 897-901.

The Bowen Court explained the crucial distinction between "specific relief" and "money damages." Quoting from an opinion of Judge Bork from the D.C. Circuit, the Court held:

The term 'money damages,' 5 U.S.C. § 702, we think, normally refers to a sum of money used as compensatory relief. Damages are given to a plaintiff to substitute for a suffered loss, whereas specific remedies are not substitute remedies at all, but attempt to give the plaintiff the very thing to which he was entitled.

Id. at 895 (quoting Maryland Dep't of Human Resources v. Department of Health and Human Servs., 763 F.2d 1441, 1446 (D.C. Cir. 1985) (Bork, J.)). Massachusetts' suit was for specific relief (i.e., the proper enforcement of a statutory mandate) that happened to involve the payment of money; it was not a suit for "money damages" (i.e., compensatory relief for a past wrong). Id. at 897-901. Accordingly, the Court held that Massachusetts' claim sought relief "other than money damages" and was properly reviewable under APA § 702.

Both pre and post Bowen precedent confirm this distinction between specific relief and money damages. See, e.g., Larson, 337 U.S. at 688 (distinguishing between actions for damages and for "specific relief: i.e., the recovery of specific property or monies, ejectment from land, or injunction either directing or restraining the defendant officer's actions"); Kidwell v. Department of the Army, 56 F.3d 279, 283-84 (D.C. Cir. 1995) (suit seeking declaratory and injunctive relief relating to correction in veteran's discharge records did not seek "money damages" although requested relief could require Government to make disability payments); Transohio, 967 F.2d at 608 (suit brought by failed thrift seeking declaration that banking regulators' actions were unconstitutional taking and violations of due process did not seek "money damages"); Sharp, 798 F.2d at 1521-24 (district court had jurisdiction to enjoin unlawful employment actions by federal officials even though such an order might result in payment of wages); Maryland Dep't of Human Resources, 763 F.2d at 1446-48 (as in Bowen, action brought by state authority seeking declaratory and injunctive relief related to federal grant program did not seek "money damages"). Accordingly,

in Bowen and the above-cited cases, courts did not bar actions for specific relief in district court, even if granting such relief would result in the payment of money to the plaintiffs.

The Government attempts to circumvent Bowen, citing cases holding that plaintiffs cannot avoid CFC jurisdiction by artfully pleading what are essentially money damages claims as requests for specific relief. (Gov't Mem. at 13-14). This argument ignores PGE's Complaint, which clearly demonstrates that the object of this suit is prospective relief to enjoin future payments, not compensation for past wrongs. (Compl. at ¶¶ 1-2, 81-121). Indeed, unlike Bowen where Massachusetts' requested relief would have resulted in the payment of money, PGE's requested relief in this Court would not result in the return of special assessments already paid. Such monetary relief would have to be obtained in a separate action, most likely in the CFC action currently pending. As the D.C. Circuit recently held:

Even where a monetary claim may be waiting on the sidelines, as long as the plaintiff's complaint only requests non-monetary relief that has 'considerable value' independent of any future potential for monetary relief -- that is, as long as the sole remedy requested is declaratory or injunctive relief that is not 'negligible in comparison' with the potential monetary recovery -- we respect the plaintiff's choice of remedies and treat the complaint as something more than an artfully drafted effort to circumvent the jurisdiction of the Court of Federal Claims.

Kidwell, 56 F.3d at 284 (citations omitted). Clearly, PGE's request for non-monetary relief has "considerable value"; it would avoid payment of approximately \$15 million in anticipated future assessments. The relief sought here is therefore not "negligible in comparison" to the recovery

sought in the CFC of approximately \$10.9 million in special assessments previously paid.¹¹ Accordingly, PGE has made a claim for "other than money damages" under APA § 702.

2. PGE Cannot Obtain "Adequate Relief" in Another Court

Invoking APA § 704,¹² the Government also contends that this Court lacks jurisdiction because the CFC may provide an "adequate remedy" under the Tucker Act (Gov't Mem. at 16); PGE's currently pending CFC action is cited as evidence of this "adequate remedy." The Government is mistaken. The adequate remedy argument ignores the fact -- relied upon in Bowen, Transohio, and a long line of subsequent cases -- that the CFC has no jurisdiction to provide the remedy PGE seeks.

It is hornbook law that the CFC lacks jurisdiction to afford general equitable relief. See Bowen, 487 U.S. at 905 ("[W]e have stated categorically that the Court of Claims has no power to grant equitable relief") (internal quotation marks omitted); Transohio, 967 F.2d at 608 (citing Bowen); Esch v. Yeutter, 876 F.2d at 984 ("[T]he Claims Court lacks equitable jurisdiction to award injunctive relief of the type appellees need").¹³ Although the Tucker Act's broad language provides for CFC "jurisdiction to render judgment upon any claim against the United States" founded on the

¹¹For the above reasons, the cases cited in the Government's memorandum are inapposite. The cases either stand for the uncontested proposition that artful pleading cannot transform what are essentially contractual claims for money damages into claims for specific relief. see Megapulse, Inc. v. Lewis, 672 F.2d 959, 967-68 (D.C. Cir. 1982), or involve specific instances of such disguised money damages claims, see, e.g., Brazos Elec. Power Coop., Inc. v. United States, 144 F.3d 784, 788 (Fed. Cir. 1998); Colorado Dep't of Highways v. United States Dep't of Transp., 840 F.2d 753, 755-56 (10th Cir. 1988). This case is clearly distinguishable because of the significant value of the prospective relief sought by PGE.

¹²"Agency action made reviewable by statute and final agency action for which there is no other adequate remedy in a court are subject to judicial review." 5 U.S.C. § 704.

¹³The CFC has jurisdiction to award equitable relief only in certain limited circumstances not present here. See, e.g., 28 U.S.C. §§ 1491(a)(2)-(3) (government contract and bid protests).

Constitution, statute, regulation, or express or implied contract. 28 U.S.C. § 1491(a)(1). it "has long been construed as waiving sovereign immunity only for claims seeking damages, and not for those seeking equitable relief." Transohio, 967 F.2d at 608 (internal quotation marks omitted). Accordingly, the CFC's jurisdiction is limited to monetary awards. See Johnson v. United States, 41 Fed. Cl. 341, 346 (1998) ("The jurisdictional parameters of the Court of Federal Claims do not allow every claim involving or invoking the Constitution, a federal statute, or a regulation to be heard in this forum [i.e., the CFC]. The claim must be for money.").

Stated another way, "the jurisdiction of the Court of Federal Claims is limited to cases in which the Constitution or a federal statute requires the payment of money damages as compensation for their violation." Brown v. United States, 105 F.3d 621, 623 (Fed. Cir. 1997). For example, "[b]ecause nothing in the due process clause requires payment of money damages for its violation, the Claims Court does not have jurisdiction over due process claims." In re Chateaugay Corp., 163 B.R. 955, 958 (S.D.N.Y. 1993), aff'd, 53 F.3d 478 (2d Cir.), cert. denied, 516 U.S. 913 (1995); see also New York Power Auth. v. United States, No. 97-236C, 1999 WL 38966 (CFC Jan. 29, 1999) (ordering stay of action in challenge to special assessment statutes based, in part, on CFC's doubtful jurisdiction to consider pure due process claims).¹⁴ PGE's takings claim is indistinguishable

¹⁴This is not to say that the CFC lacks jurisdiction to consider a due process argument raised in an action over which it would otherwise have jurisdiction (i.e., a claim for money damages against the Government). The CFC lacks jurisdiction only over an independent due process claim not tied to some other money-mandating claim (e.g., illegal exaction). See Alabama Hosp. Ass'n v. United States, 656 F.2d 606, 609-10 (Ct. Cl. 1981) ("[W]here a claim appears to be within [the Tucker Act], as for example one founded on statute or contract, that claim is not removed from our jurisdiction merely because a plaintiff must make a constitutional argument to prevail"), cert. denied, 456 U.S. 943 (1982); Cameron v. United States, 34 Fed. Cl. 422, 426 n.10 (1995) (CFC may entertain serviceman's back pay or wrongful discharge claim based upon constitutional violation); Marrero Land & Improvement Ass'n, Ltd. v. United States, 26 Cl. Ct. 193, 196 (1992) (claims court refused

(continued...)

from its due process claim in this regard: the former "seek[s] not compensation, but invalidation of the law that requires [PGE] to pay those [special assessments]. Therefore, plaintiffs' "takings'-claim actually is a claim of deprivation of due process and not a claim for compensation that is within the exclusive jurisdiction of the Court of Claims." In re Chateaugay Corp., 163 B.R. at 959.¹⁵

The natural extension of this principle -- that the CFC's jurisdiction is limited to monetary awards -- is that the CFC lacks jurisdiction to declare a statute invalid, precisely the type of relief sought by PGE in this case. See Yeskoo v. United States, 34 Fed. Cl. 720, 731 (1996) (holding CFC lacks jurisdiction to declare statute or enabling regulations invalid), aff'd, 101 F.3d 715 (Fed. Cir. 1996); cf. Bowen, 487 U.S. at 905 n.42 (noting that Claims Court's jurisdiction to review Medicaid disallowance claim was unclear because Medicaid statute does not mandate compensation to States for damages but rather subsidizes future state expenditures); Esch, 876 F.2d at 985 (Claims Court's jurisdiction doubtful where plaintiffs "assert no claim for a sum immediately due and owing by the Federal Government" and statute under review does not mandate compensation). As demonstrated above, PGE has not sought money damages or their "equivalent." Rather, PGE seeks only prospective declaratory and injunctive relief against further enforcement of the Special Assessment Statutes. Such relief is beyond the power of the CFC to grant.

In Bowen, the Supreme Court recognized that the CFC's jurisdictional limitations argued for an interpretation of APA § 704 that broadened the availability of review in district court. As here.

¹⁴(...continued)
to dismiss action for just compensation where due process violation allegedly resulted in taking of property).

¹⁵The Government argues that such a takings claim is not cognizable in this Court. As discussed in greater detail below, however, the controlling precedent holds otherwise. See Eastern Enters., 118 S. Ct. at 2145; Student Loan Mktg. Ass'n, 104 F.3d at 401-02; In re Chateaugay, 53 F.3d at 491-93.

the Government argued in Bowen that § 704 should be construed to bar district court review because monetary relief against the United States was available in the Court of Claims (the predecessor to the CFC) under the Tucker Act. 487 U.S. at 904. Rejecting this "restrictive -- and unprecedented -- interpretation of § 704," the Court held that the availability of money damages in the CFC is "plainly not the kind of 'special and adequate review procedure' that will oust a district court of its normal jurisdiction under the APA." Id. (citations omitted). Given the APA's general purpose to "remove obstacles to judicial review," id.,¹⁶ the Court noted that "[t]he policies of the APA take precedence over the purposes of the Tucker Act. . . . The Court of Claims is a court of limited jurisdiction, because its jurisdiction is statutorily granted and it is to be strictly construed." Id. at 908 n.46. Particularly where the parties have an ongoing relationship and continuing obligations, the Court was "not willing to assume, categorically, that a naked money judgment against the United States will always be an adequate substitute for prospective relief." Id. at 905; see also Transohio, 967 F.2d at 608-609 (following Bowen in holding that "naked money judgment" did not provide adequate relief and allowing district court review of agency action under APA); Esch, 876 F.2d at 984-85 (same).

So here, a "naked money judgment" in the CFC would not provide PGE with adequate relief. Should future assessments not be enjoined, PGE faces annual payments over the next eight years eventually totaling approximately \$15 million. (Compl. at ¶¶ 74, 79). The CFC lacks jurisdiction to declare the Special Assessment Statutes unconstitutional and enjoin their future

¹⁶Indeed, the Bowen Court noted that § 704 merely codified the proposition that "[o]ne need not exhaust administrative remedies that are inadequate." 487 U.S. at 902 (quoting K. Davis, Administrative Law § 26:12, at 468 (2d ed. 1983)). Section 704 simply provides that, where no other avenue of relief is adequate (*i.e.*, where pursuing other remedies would be futile), a party need not "exhaust" those inadequate remedies before seeking APA review.

enforcement. This case therefore falls precisely within the scope of Bowen, Transohio, Esch, and other cases holding district court review proper under the APA.

Further, as also recognized in Bowen, PGE has an interest in "planning future programs" that makes it "important to seek judicial review . . . as promptly as possible." 487 U.S. at 906-907. Notwithstanding the recent deregulation of the energy industry, PGE continues to operate in a highly-regulated environment at the national, state, and local level. Facing new competitive incentives and pressures, PGE must be allowed the maximum possible flexibility to set rates at competitive levels and to conduct long-term planning. Leaving the constitutionality of the Special Assessment Statutes in doubt undermines PGE's efforts and underscores its need to obtain prospective relief and guidance.

Skirting Bowen, the Government argues that a money judgment by the CFC would "declare" the parties' rights here just as effectively as would declaratory and injunctive relief. (Gov't Mem. at 17). This action, however, seeks to enjoin future enforcement of an unconstitutional statute. The Government has provided no firm assurance, nor could it, that it would refrain from future imposition of special assessments mandated by the statute, even if the CFC were to award money damages.¹⁷ A federal agency cannot lightly disregard an Act of Congress that has not been specifically struck down and therefore remains on the books. Even after a CFC money judgment, PGE could be left to the absurd course of bringing a new refund action each year to recover that year's special assessment. Cf. Student Loan Mktg. Ass'n v. Riley, 907 F. Supp. 464, 469 (D.D.C.

¹⁷The best the Government is able to offer is the statement that "a Court of Federal Claims judgment in plaintiffs' favor would be enforceable against the Government in the unlikely event that the Government would seek to collect future special assessments in contravention of a such judgment [sic]." (Gov't Mem. at 17). As demonstrated in the following text, that assurance is woefully inadequate.

1995) (in takings claim involving statute mandating direct transfer of funds to Government. "requir[ing] continuous refund actions [in the CFC] would be inefficient" where "actions to recoup those payments would have to be filed every time payments are made"), aff'd, 104 F.3d 397 (D.C. Cir.), cert. denied, 118 S. Ct. 295 (1997). A declaratory judgment and injunction from this Court would preclude the necessity of such a wasteful exercise by removing all doubt. In short, a money judgment from the CFC is not an "adequate remedy" that ousts this Court of jurisdiction under the APA.

3. The Tucker Act Does Not Impliedly Forbid PGE's Requested Relief

The remaining exception to APA § 702 depends on whether PGE's requested relief is expressly or impliedly forbidden by another statute. The Government makes two arguments under this heading: (1) this case essentially requests specific relief on a contract claim, over which the CFC has exclusive jurisdiction and which is therefore impliedly forbidden by the Tucker Act; and (2) because the Tucker Act allows claims for "just compensation," PGE's takings claim in this Court is premature. (Gov't Mem. at 6-12). Both arguments are directly contradicted by Supreme Court and D.C. Circuit precedent that is squarely in point.

a. Tangential Contractual Issues Do Not Divest This Court of Jurisdiction

The Government first notes that the Tucker Act grants exclusive jurisdiction over contract claims to the CFC, where declaratory or equitable relief is unavailable. (Id. at 6-7). This proposition is unremarkable. See Transohio, 967 F.2d at 609 (APA § 702 does not waive sovereign immunity for contract actions against the government); Sharp, 798 F.2d at 1523 ("The sole remedy for an alleged breach of contract by the federal government is a claim for money damages" either in CFC under Tucker Act or in federal district court under Little Tucker Act, 28 U.S.C. § 1346(a)(2). for

claims under \$10,000).¹⁸ But the Government misconceives its application to the instant case. The law of this Circuit is clear that the Tucker Act does not preclude review of constitutional claims in the district court simply because they also raise or involve contractual issues. While this suit may tangentially raise contractual issues, the crux of PGE's claims is constitutional, and they are properly before this Court.

The D.C. Circuit most clearly expounded the doctrine in Transohio. That case involved an action by a failed thrift against the Office of Thrift Supervision ("OTS") because OTS reneged on an agreement under which the thrift had been permitted to claim "regulatory goodwill" as an intangible asset and thereby satisfy certain regulatory capital requirements. 967 F.2d at 601-606. As here, Congress attempted to resolve a financial crisis by enacting a statute which the thrift alleged unconstitutionally deprived it of property rights conferred by the prior agreement. Id. at 600-601. The thrift sought a declaration that the statute was unconstitutional, or, in the alternative, specific performance of its Government contract or rescission of certain underlying transactions. Id. at 608.

Although the thrift's "pure contract" claims for specific performance and rescission were dismissed, the court held that the district court properly exercised jurisdiction over the constitutional

¹⁸It is somewhat misleading to state that CFC jurisdiction is "exclusive" under the Tucker Act. Because claims against the Government generally require a waiver of sovereign immunity, CFC jurisdiction is said to be "'exclusive' only to the extent that Congress has not granted any other court authority to hear the claims that may be decided by the Claims Court." Bowen, 487 U.S. at 910 n.48; see also Transohio, 967 F.2d at 612. The doctrine referred to above simply recognizes that the CFC under the Tucker Act has traditionally had exclusive jurisdiction over contract claims. Because specific performance or other equitable relief is not available in the CFC under the Tucker Act, however, courts have held that the Tucker Act impliedly forbids specific relief on a contract claim under the APA. See Transohio, 967 F.2d at 612-13; Sharp, 798 F.2d at 1523-24. As discussed in the following text, because the instant case is a constitutional case, rather than a contract case, this doctrine does not bar the Court's exercise of jurisdiction here.

takings and due process claims. Rejecting the Government's categorical argument, repeated here, that the mere existence of contractual issues divests a district court of jurisdiction, the court noted:

The answer to the sovereign immunity and jurisdiction questions depends not simply on whether a case involves contract issues, but on whether, despite the presence of a contract, plaintiffs' claims are founded only on a contract, or whether they stem from a statute or the Constitution.

Id. at 609. The court held that "litigants may bring statutory and constitutional claims in federal district court even when the claims depend on the existence and terms of a contract with the government." Id. at 610 (emphasis added). Although the thrift's due process and takings claims involved a contractual relationship with the Government, these claims were not "founded upon" the contract, but on the Constitution. Id. at 611. The court flatly rejected the Government's argument that "Congress intended to preclude any review at all of constitutional claims seeking equitable relief, where the constitutional claims stem from contracts." Id.

Transohio relied in large part on then-Judge Scalia's earlier holding in Sharp. That case involved the challenge by a federal judge, who was also an officer in the Air Force Ready Reserve, to an order by the Secretary of Defense requiring that he be transferred to the Standby Reserve. 798 F.2d at 1521. In addition to seeking a declaratory judgment that the Government had breached a valid contract and requesting specific performance thereof, the judge also raised statutory and constitutional due process claims. Id. at 1523. As in Transohio and here, the Government argued that the district court lacked jurisdiction under the APA because the judge's contract claims could only be considered in the CFC, where such equitable relief was not available. Id. The court rejected this argument, separating the plaintiff's pure contract claims from the constitutional and statutory claims. Id. Judge Scalia concluded that "[t]he District Court properly exercised jurisdiction to consider [plaintiff's] claim that his reassignment would violate federal regulations, statutes and the

Constitution" and his request for declaratory and injunctive relief on those grounds. Id. at 1524. The "pure contract" claims were dismissed. Id.

Similarly, in Megapulse, the D.C. Circuit considered "the possible conflict between jurisdiction over APA-based claims and the restricted role of the federal courts in contract actions under the Tucker Act." 672 F.2d at 966-67. There, a government contractor sought to enjoin the Government from disclosing certain disputed data (allegedly intellectual property of the contractor) in violation of the Trade Secrets Act. Id. at 964. Again, the Government argued that the claims were "essentially contractual" and therefore the contractor should not be permitted to evade the Tucker Act's limitations "by casting its pleadings in terms that would enable a district court to exercise jurisdiction . . . under the APA." Id. at 967.

The court held that the contractor's claims were statutory, not contractual, and that jurisdiction was proper in the district court:

Contract issues may arise in various types of cases where the action itself is not founded on a contract. A license, for example, may be raised as a defense in an action for trespass, or a purchase contract may be raised to counter an action for conversion. But the mere fact that a court may have to rule on a contract issue does not, by triggering some mystical metamorphosis, automatically transform an action based on trespass or conversion into one on the contract and deprive the court of jurisdiction it might otherwise have.

Id. at 968 (emphasis added). Although it would be required to pass upon certain contractual issues to decide the contractor's statutory claim, the court was not "ousted" of its usual jurisdiction under the APA to review the Government's action. Id. at 968-70.¹⁹

¹⁹This principle is similar to that affirming the CFC's power to decide constitutional issues raised in connection with claims for money damages otherwise within the CFC's jurisdiction. See Alabama Hosp. Ass'n, 656 F.2d at 609-10; (Gov't Mem. at 16). Just as the CFC is not ousted of jurisdiction simply because a constitutional issue is raised in a Tucker Act case, so too a district court is not deprived of jurisdiction merely because a contractual issue is raised in an APA action.

Decisions of this Court also recognize the crucial distinction between contract claims, over which a district court lacks jurisdiction, and constitutional and statutory claims that happen to involve contractual issues. See Americable Int'l, Inc., 931 F. Supp. at 2-4 (holding court had jurisdiction over statutory and First and Fifth Amendment claims but not over allegations of cable franchise violation); York Assocs., Inc. v. Secretary of Housing & Urban Dev., 815 F. Supp. 16, 19-22 (D.D.C. 1993) (holding court had jurisdiction over statutory and constitutional claims relating to loan contracts with federal agency but lacked jurisdiction over breach of contract claims).²⁰

Indeed, this very Court recently applied the Transohio principle to exercise jurisdiction over a constitutional claim brought by a government contractor. In Ervin and Assocs. Inc. v. Dunlap, No. 96-CA-1253 (WBB), 1997 WL 1067754 (D.D.C. Feb. 14, 1997) (Bryant, J.) (see Exhibit 1), Ervin, a contractor with the Department of Housing and Urban Development ("HUD"), alleged that it was denied contracting opportunities in retaliation for exposing alleged fraud and corruption in HUD's procurement practices. Id. at *1-*3. Ervin claimed, inter alia, that this retaliatory conduct violated its constitutional rights under the First and Fifth Amendments. Id. at *1. In familiar fashion, the Government argued that this Court lacked jurisdiction because "the constitutional and statutory violations arise out of and affect Ervin's relationship with the government as a contractor, and the relief he requests implicates specific contracts." Id. at *8.

Relying on Transohio, Sharp, and Megapulse, this Court retained jurisdiction over the constitutional claims, even though they raised contractual issues: "In deciding these claims, the

²⁰Cases from other jurisdictions also support this key distinction. See, e.g., Katz v. Cisneros, 16 F.3d 1204, 1208 (Fed. Cir. 1994) (holding that district court properly exercised jurisdiction over statutory claim which related to "Section 8" rent supplement contracts between housing provider and Secretary of Housing and Urban Development); Chemung County v. Dole, 781 F.2d 963, 969-71 (2d Cir. 1986) (holding district court properly exercised jurisdiction over claim that agency violated statute in awarding government contract).

Court may have to determine the terms of the contracts, but the contract determinations are merely premises for the ultimate determination of whether HUD is retaliating against Ervin in violation of the First Amendment. Furthermore, Ervin does not seek monetary damages for 'breach of contract,' but an injunction against unconstitutional obstruction of Ervin's ability to continue to do business." Ervin, 1997 WL 1067754, at *9. This Court therefore rejected the Government's blanket assertion that a case raising contractual issues is necessarily a "contract case" not properly within the purview of a district court under the APA.

Similarly, PGE's constitutional claims are not "founded on the contract," although they raise contractual issues. In Count I, PGE alleges that the Special Assessment Statutes violate the Takings Clause because they impose severely retroactive liability that is substantially disproportionate to any of its conduct or responsibility for the Government's D&D costs and contrary to PGE's legitimate investment-backed expectations. (Compl. at ¶¶ 81-95). The property interests alleged to have been taken are not only the "economic benefits represented by the various contracts [PGE] entered into with the [Government] and [has] fully performed," (id. at ¶ 90), but also the substantial special assessment payments that must be made to the D&D fund. (Id. at ¶¶ 90-91). Thus, PGE's takings claim is not based solely on "contract rights." Count II alleges a deprivation of constitutional due process stemming from the imposition of a harsh and disproportionate liability on a small group of domestic utilities, singled out based on prior contractual relationships with the Government. (Id. at ¶¶ 96-105). Thus, the statutes are alleged to be irrational and arbitrary, in violation of the Due Process Clause. Finally, Counts III-IV allege that the Special Assessment Statutes impair PGE's completed contracts with the Government, thereby unconstitutionally depriving it of due process.

(Id. at ¶¶ 106-116).²¹ Count V simply seeks an injunction against further enforcement of the Special Assessment Statutes based on the declaratory relief requested in Counts I-IV (Id. at ¶¶ 117-121). As in the above-cited cases, all five counts raise constitutional challenges regarding the deprivation of protected property interests. The fact that these property interests derive, in part, from contracts -- or that resolving the claims may require reference to, or interpretation of, contracts -- does not oust this Court of jurisdiction.²²

b. PGE's Takings Claim in this Court Is Not Premature

The Government also mounts a jurisdictional attack targeted specifically at PGE's takings claim. It asserts that the "[t]he availability of a Tucker Act remedy [for just compensation] renders premature a taking claim for equitable relief in the district court." (Gov't Mem. at 9).²³ In the

²¹Thus, at bottom, Counts III and IV complain not about a breach of PGE's contracts, but about the impropriety of the Special Assessment Statutes. They do not seek specific performance of the contracts or damages for breach, but a declaration that the statutes are invalid and unenforceable. See Transohio, 967 F.2d at 610-11.

²²The cases cited by the Government are either distinguishable or irrelevant. The Government selectively cites Transohio, Sharp, and Megapulse, without discussing the central teaching of these cases discussed above. (Gov't Mem. at 7, 11). It also disingenuously cites pre-Transohio precedent from this Court, Olympic Fed. Savs. & Loan Ass'n v. Director, OTS, C.A. No. 90-0482 (RCL), 1990 WL 134841 (D.D.C. 1990) (Gov't Mem. at 10), or inapplicable precedent from other courts, some of which explicitly rejects Transohio. See Tucson Airport Auth. v. General Dynamics Corp., 136 F.3d 641, 647-48 (9th Cir. 1998) (declining to follow Transohio); North Star Alaska v. United States, 14 F.3d 36, 37-38 (9th Cir. 1993) (rejecting plaintiff's claim for reformation of contract), cert. denied, 512 U.S. 1220 (1994). Whatever the law elsewhere, Transohio, Sharp, and Megapulse undisputably state the law governing this case, as this Court correctly recognized in Ervin. This Court's jurisdiction also is not impaired by the fact that granting the declaratory and injunctive relief sought here might be the equivalent of specific performance of the Government's agreements with PGE. See Transohio, 967 F.2d at 611; Megapulse, 672 F.2d at 971.

²³The general theory that such a takings claim should first be brought in the CFC under the Tucker Act relies on the principle that the taking of property is not itself unconstitutional, so long as just compensation is provided. Preseault v. ICC, 494 U.S. 1, 11-12 (1990); Transohio, 967 F.2d at 613-14.

Government's view, since PGE could seek money damages for the alleged taking in the CFC, this Court lacks jurisdiction over PGE's takings claim here. Again, the Government simply ignores governing precedent to the contrary.

Where, as here, a statute mandates direct transfer of funds to the Government, the presumption of the availability of a Tucker Act remedy is reversed, and the takings claim may properly be brought in district court. See Eastern Enters., 118 S. Ct. at 2145-46; Student Loan Mktg. Ass'n, 104 F.3d at 401-02; In re Chateaugay, 53 F.3d at 492-93. As stated by the Second Circuit in Chateaugay, "where the challenged statute requires a person or entity to pay money to the government, it must be presumed that Congress had no intention of providing compensation for the deprivation through the Tucker Act." Id. at 493. Otherwise, "[e]very dollar paid pursuant to a statute would be presumed to generate a dollar of Tucker Act compensation." Id. The Supreme Court recently applied this doctrine in Eastern Enters., holding that a group of coal operators could bring a district court takings challenge to a statute requiring them retroactively to fund pension liabilities based on past contracts. 118 S. Ct. at 2145-46; see also Chateaugay, 53 F.3d at 492-94 (permitting district court takings challenge to same statute at issue in Eastern Enters.).

The D.C. Circuit's similar holding in Student Loan Mktg. Ass'n controls this case. There, Sallie Mae sought a declaratory judgment that an "offset fee" assessed by statute on certain student loans was an unconstitutional taking. 104 F.3d at 401. Unlike the statute at issue in Eastern Enters. and Chateaugay, which required payments to certain pension plans, this statute mandated a direct transfer of money to the Government. Id. The court held: "[I]n cases involving straightforward mandates of cash payment to the government, courts may reasonably infer either that Tucker Act

jurisdiction has been withdrawn or at least that any continued availability does not wipe out equitable jurisdiction. Accordingly, we reach the merits." Id. at 402.

The Government attempts to distinguish Eastern Enters. and Chateaugay in a footnote, suggesting that the cases are inapplicable because they involved payments to a "privately operated fund." (Gov't Mem. at 9 n.5). Its brief fails even to mention Student Loan Mktg. Ass'n, which not only is controlling in this jurisdiction but did involve a direct transfer of funds to the Government. That case is squarely on point, since the Special Assessment Statutes also clearly impose a "straightforward mandate[] of cash payment to the government." 104 F.3d at 402. For this reason, the Court must reject the Government's attempt to deprive this Court of jurisdiction over PGE's prospective takings claim.

D. Because this Court has Jurisdiction, the Government's Motion to Transfer this Action to the CFC Must Be Denied

The Government seeks transfer of this case under 28 U.S.C. § 1631, which permits the Court, "if it is in the interest of justice," to transfer a matter to the CFC on finding that "there is a want of jurisdiction." As the above discussion demonstrates, this Court has subject matter jurisdiction over this case under 28 U.S.C. §§ 1331, 1361. 2201-2202 and sovereign immunity has been waived under APA § 702. Accordingly, transfer of this action to the CFC under § 1631 is simply unavailable. See FDIC v. Maco Bancorp, Inc., 125 F.3d 1446, 1447-48 (Fed. Cir. 1997) (concluding there was no appellate jurisdiction to review district court's transfer decision where district court had not first found that it lacked jurisdiction under § 1631); National Ctr. for Mfg. Sciences v. United States, 114 F.3d 196, 198 (Fed. Cir. 1997) (reversing district court's decision to transfer action to CFC because district court had subject matter jurisdiction under APA).

The Government's offensive use of § 1631 against PGE is particularly ironic given that provision's purpose and pedigree. Congress enacted § 1631 to "enhance citizen access to justice" by ensuring that "a case mistakenly filed in the wrong court [could] be transferred as though it had been filed in the transferee court on the date in which it was filed in the transferor court." Alexander v. Commissioner of Internal Revenue, 825 F.2d 499, 501 (D.C. Cir. 1987) (citations omitted); see also Jeffrey W. Tayon, The Federal Transfer Statute: 28 U.S.C. § 1631, 29 S. Tex. L. Rev. 189, 197-201 (1987) (statute designed to prevent unfairness from a litigant's choice of a wrong court). Here, the Government cynically invokes the statute, not to safeguard PGE's right to have its case heard, but to transfer the case to a forum in which the requested relief is unavailable. Section 1631 was never intended to be abused in this manner.²⁴

Of course, for the same reason that transferring this case to the CFC is not appropriate under § 1631, the Government's motion to dismiss for lack of subject matter jurisdiction under Fed. R. Civ. P. 12(b)(1) must also be denied.

²⁴Of course, the Government's resort to § 1631 has an added tactical benefit from its standpoint. By invoking § 1631 to seek transfer, the Government clearly hopes to obtain a 60-day stay in this Court under 28 U.S.C. § 1292(d)(4)(B), and perhaps even a further stay pending an interlocutory appeal to the Federal Circuit. See 28 U.S.C. § 1292(d)(4)(A)-(B) (Gov't Mem. at 2 n.2). Such dilatory tactics by the Government are not to be applauded. In any event, this transparent ploy should avail the Government nothing, as the CFC action has been stayed pending the outcome here, or in other cases pending in the Southern District of New York and the CFC.

IV. CONCLUSION

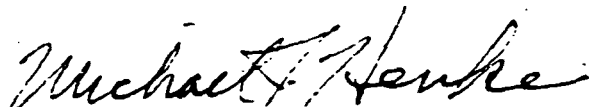
For the reasons set out above, the Government's motion to dismiss or transfer should be denied. This Court has clear jurisdiction to grant declaratory and injunctive relief on the constitutional claims raised by the Complaint.

Respectfully submitted,

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Dated: March 12, 1999

CERTIFICATE OF SERVICE

I hereby certify that on this 12th day of March, 1999, a true and correct copy of the foregoing Memorandum of Points and Authorities in Opposition to the Government's Motion to Transfer, Or, in the Alternative, to Dismiss for Lack of Jurisdiction was served upon counsel of record by first-class mail, postage prepaid, to the following:

Theodore R. Carter, III
Commercial Litigation Branch
Civil Division
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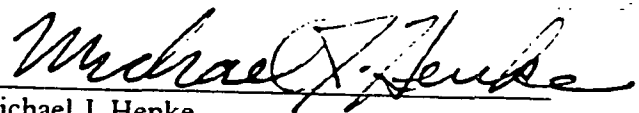

Michael J. Henke

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IN THE UNITED STATES COURT OF FEDERAL CLAIMS

PORTLAND GENERAL ELECTRIC COMPANY,)
et al.,)
Plaintiffs,)

v.)

THE UNITED STATES,)

Defendant.)

No. 97-322C
(Judge Turner)

MOTION TO DISMISS

Pursuant to RCFC 12(b), defendant United States of America respectfully requests that the Court dismiss plaintiffs' complaint for failure to state a claim upon which relief can be granted.

STATEMENT OF ISSUES

1. Whether the Energy Policy Act's monetary assessment takes or breaches any of plaintiffs' contract-based property rights.
2. Whether the Energy Policy Act's monetary assessment constitutes a taking within the meaning of the Takings Clause of the Fifth Amendment to the United States Constitution.
3. Whether the Energy Policy Act's monetary assessment violates the Due Process Clause of the Fifth Amendment to the United States Constitution.

STATEMENT OF THE CASE

Plaintiffs, participants in the domestic nuclear utility industry, commenced this action challenging the monetary

assessment imposed upon them pursuant to the Energy Policy Act of 1992. This case is one of more than thirty cases seeking relief similar to that granted by the Court of Federal Claims to another domestic utility company in Yankee Atomic Electric Co. v. United States, 33 Fed. Cl. 580 (1995), wherein the court held that the special assessment levied pursuant to the Energy Policy Act of 1992 breached Yankee Atomic's prior contracts with the United States and constituted an unlawful exaction under the Takings Clause of the Fifth Amendment.

The Court of Appeals for the Federal Circuit subsequently reversed this opinion, finding no breach of contract and no constitutional violation. Yankee Atomic v. United States, 112 F.3d 1569 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 2365 (1998). The Federal Circuit found that Yankee Atomic's contracts (which are in substance identical to plaintiffs' herein) did not preclude the special assessment. Id. at 1576-82. The assessment was not a retroactive price increase. Id. Rather, the assessment was in the nature of a general tax falling proportionately on all utilities that benefitted from uranium enrichment services. Id. Thus, the special assessment did not breach or otherwise abrogate any contract rights. Id. "Because the contracts did not contain an unmistakable promise against a future assessment, Yankee Atomic had no property right (via a vested contract right) which was subsequently taken by the assessment." 112 F.3d at 1580 n.8.

The Federal Circuit opinion also rejected Yankee Atomic's

due process arguments. Yankee Atomic identified two issues as being raised by the Government's appeal. One related to the alleged takings. The other involved the Due Process Clause:

2. Whether, in view of Yankee's fixed-price contract rights, the judgment of the court below rejecting the government's imposition of the retroactive per-unit price increase should also be affirmed as a Due Process Clause violation?

(Brief for Plaintiff/Cross-Appellant at 2, filed April 16, 1996; a copy of the relevant part is attached hereto.) Accordingly, Yankee Atomic devoted an entire section to its due process argument. (*Id.* at 38-41.) The court's reversal of the lower court opinion, of course, evidences its rejection of Yankee Atomic's due process argument. While the court did not expressly articulate a due process holding, it did find that the Energy Policy Act assessment was in the nature of a general tax falling proportionally on utilities that benefitted from uranium enrichment services. 112 F.3d at 1576. The court found that the assessment was similar to at least one other retroactive statute that is frequently, unsuccessfully challenged as a violation of the Due Process and Takings Clauses. *Id.* at 1576 n.6.

Plaintiffs' complaint asserts that the monetary assessments under the Energy Policy Act of 1992 impose a severe, disproportionate and extremely retroactive burden in violation of its property and due process rights. Specifically, plaintiffs' complaint alleges that the special assessment constitutes (1) an unlawful taking and/or breach of contract rights; (2) an unlawful

taking of property rights in violation of the Takings Clause of the Fifth Amendment; and (3) a violation of due process rights protected by the Fifth Amendment.

Plaintiffs' complaint specifically relies upon Eastern Enterprises v. Apfel, 118 S. Ct. 2131 (1998). In Eastern Enterprises, a divided Supreme Court held that an assessment under the Coal Industry Retiree Health Benefit Act of 1992 was unconstitutional as applied to Eastern Enterprises. Application of the Coal Act to Eastern Enterprises obligated it to pay premiums to cover health benefits of former employees who had worked for the company before 1966. Eastern had ceased coal mining operations in 1965. Four Justices held that the assessment violated the Takings Clause; one Justice held that the Takings Clause was inapplicable but that the assessment violated the Due Process Clause; and four Justices held that the Takings Clause was inapplicable and that the assessment did not violate the Due Process Clause. Relying primarily upon the minority view that a monetary assessment can constitute a taking, plaintiffs claim that the Energy Policy Act is unconstitutional as applied to it.

The Energy Policy Act of 1992

In 1992, Congress created a "comprehensive national energy policy" designed "to implement solutions to our nuclear waste and uranium enrichment problems." H.R. Rep. No. 102-474, 102d Cong., 2d Sess. Pt. 1, at 132 (1992). Among those problems was the fact that existing uranium enrichment plants, which the Department of

Energy ("DOE") had used to provide enrichment services to domestic utility companies since the 1950s, needed to be decontaminated and decommissioned. Domestic utility companies were significant customers of the Government's uranium enrichment services.

Estimates prepared at the direction of DOE indicated that the total cost of this clean-up could exceed \$20 billion over 40 years. The General Accounting Office calculated that about \$500 million per year, indexed to inflation, would be required to meet these estimates. H.R. Rep. No. 102-474, 102d Cong., 2d Sess., Pt. VIII, at 77 (1992), reprinted in 1992 U.S.C.C.A.N. 2282, 2295.

DOE proposed to Congress that clean-up of the enrichment facilities be financed through revenues derived from the current and future enrichment contracts as well as a tax on electricity generated in the future by each domestic nuclear power reactor. The utility industry criticized this proposal as inequitable primarily because it imposed the entire cost of the clean-up on domestic utilities. H.R. Rep. No. 102-474, 102d Cong., 2d Sess., Pt. I, at 144-45 (1992), reprinted in 1992 U.S.C.C.A.N. 1954, 1967-68.

The House Energy and Commerce Committee abandoned the idea of such a tax and proposed instead the creation of a fund to consist of deposits in the amount of \$500 million per year derived primarily from payments made by the new United States Enrichment Services Corporation and foreign utilities that had

also purchased enrichment services from the Government. If these sources proved insufficient, domestic utilities could be required to make up the shortfall by a special assessment based on the percentage of uranium enrichment services they had purchased in the past. The assessments were to continue until sufficient funds had been collected to clean up the plants.

Testifying before the House Ways and Means Committee, representatives of domestic nuclear utilities expressed their willingness to help fund the clean-up effort but asserted that "a fair program must specify realistic and equitable ratepayer allocation, and establish a cap to protect ratepayers from being assessed more than a fair share." Comprehensive National Energy Policy Act: Hearings Before the House Comm. on Ways and Means, 102d Cong., 2d Sess. 181 (1992). With these goals in mind, the utility company representatives expressed their approval of a \$2.5 billion special assessment on those domestic utilities that had purchased the contaminating uranium enrichment services, but suggested that the term of the special assessment be limited to 15 years or the time necessary to collect \$2.5 billion, whichever came first. Id. at 178-83. Supporters of that proposal included Commonwealth Edison Company, Southern California Edison Company, the American Nuclear Energy council, and the Edison Electric Institute. Id.

The House Ways and Means Committee concluded that it was "important to provide more certainty to taxpayers regarding contributions to the [clean-up] Fund." Accordingly, it agreed to

the utility industry suggestion that the special assessment be limited to \$2.5 billion or 15 years. H.R. Rep. No. 102-474, 102d Cong., 2d Sess., Pt. VI, at 28 (1992), reprinted in 1992 U.S.C.C.A.N. 2232, 2239.

~~As eventually enacted, the Energy Policy Act of 1992, Pub.~~
L. No. 102-486, § 1031, 106 Stat. 2953-54, codified at 42 U.S.C. §§ 2297g and 2297g-1, added sections 1801 and 1802 to the Atomic Energy Act of 1954 which establish a Uranium Enrichment Decontamination and Decommissioning Fund to accumulate the funds necessary for the cleanup of the uranium enrichment facilities. The Fund is derived primarily from congressional appropriations, supplemented by a limited annual special assessment collected from the utility companies that purchased and used the contaminating uranium enrichment services. The determination of the utilities to be assessed, and the amount to be assessed from each, depends upon the share of the uranium enrichment services that each utility purchased and did not resell. Thus, for example, if a utility had purchased five percent of the contaminating uranium enrichment services, that utility would be assessed five percent of the annual special assessment, unless the utility had later resold the services, in which case the services would be counted toward the purchasing utility's pro rata share and deducted from the selling utility's share. 42 U.S.C. 2297g-1(c). The special assessment terminates after the earlier of 15 years or the collection of \$2.25 billion. 42 U.S.C. 2297g-1(e). Each utility that is subject to the

assessment is authorized to count the assessed amounts as a "necessary and reasonable current cost of fuel," which is thus "fully recoverable in rates * * * in the same manner as the utility's other fuel cost." 42 U.S.C. 2297g-1(g).

ARGUMENT

Plaintiffs' complaint represents a futile attempt to survive the Federal Circuit's determination in Yankee Atomic that a special assessment under the Energy Policy Act of 1992 did not breach or otherwise abrogate any of the plaintiffs' contract rights, and that the assessment did not unconstitutionally "take" any protected property right. 112 F.3d at 1576-82. Plaintiffs' complaint instead asserts that the monetary assessment itself constitutes an unconstitutional taking. This assertion flies in the face of valid and binding Federal Circuit and Supreme Court precedent that a requirement to pay money is not a taking of property within the meaning of the Fifth Amendment.

Plaintiffs base their "taking" argument on the minority view in the plurality opinion of Eastern Enterprises v. Apfel, 118 S. Ct. 2131 (1998), wherein four justices deemed a different type of monetary assessment under the Coal Industry Retiree Health Benefit Act to constitute an unconstitutional taking. As discussed below, Eastern Enterprises is inapposite, limited to its facts, and, by virtue of its fragmented parts, only binding in its specific result — holding the Coal Act assessment unconstitutional as applied to Eastern Enterprises.

Moreover, plaintiffs proffer a different property right, not a fundamentally different cause of action than that presented in Yankee Atomic. Plaintiffs' arguments regarding the constitutionality of the Energy Policy Act assessment are not ~~entirely new. That is, whether the assessment constituted a~~ taking or a due process violation was actually at issue in Yankee Atomic. The retroactive nature of the assessment was at issue. The Federal Circuit rejected those taking and due process arguments. Absent some new result required by plaintiffs' focus on a different property right, this Court is bound by the Federal Circuit's findings in Yankee Atomic.

I. PLAINTIFFS' TAKING AND/OR BREACH OF CONTRACT-BASED RIGHTS ALLEGATION HAS BEEN EXPRESSLY REJECTED BY THE FEDERAL CIRCUIT

In Count I of its complaint, plaintiffs assert, ostensibly for protective purposes, that the special assessments imposed by the Energy Policy Act constitute a taking and/or breach of plaintiffs' contract-based rights. This issue was unquestionably resolved by the Federal Circuit's ruling in Yankee Atomic. There the court noted that "[r]egardless of whether the situation is characterized as a breach of contract, an unlawful taking, or an unlawful exaction, the arguments stem from Yankee Atomic's prior contracts with the Government." 112 F.3d at 1573 n.2. Yankee Atomic's contracts, which are in substance identical to plaintiffs' contracts, did not preclude the special assessment. Id. at 1576-82. The Federal Circuit specifically found that the

assessment was not a retroactive price increase. Id. Rather, the assessment was in the nature of a general tax falling proportionately on all utilities that benefitted from uranium enrichment services. Id. Thus, the special assessment did not breach or otherwise abrogate any contract rights. Id.

As plaintiffs apparently agree, this Court is bound by the Federal Circuit's rejection of their argument. See, e.g., Compliance Corp. v. United States, 22 Cl. Ct. 193, 204-05 n.9 (1990) (decisions of the Federal Circuit are binding on the Claims Court), aff'd, 960 F.2d 157 (Fed. Cir. 1992). Accordingly, the Court should dismiss Count I of plaintiffs' complaint.

II. THE FEDERAL CIRCUIT'S CONCLUSION THAT THE ENERGY POLICY ACT ASSESSMENT IS CONSTITUTIONAL BINDS THIS COURT

Plaintiffs' constitutional claims fail as a matter of law because, as determined by the Federal Circuit in Yankee Atomic, the Energy Policy Act's special assessment targeted companies that used and benefitted from the Government's uranium enrichment services and falls proportionally on utilities that benefitted from those services. 112 F.3d at 1575-76. As such, Congress acted in a rational manner in imposing this assessment and fairly spread cleanup costs among those benefitting from uranium enrichment services.

As is often noted in cases of this sort, a party challenging governmental action as unconstitutional bears a substantial burden. See, e.g., United States v. Sperry Corp., 493 U.S. 52, 60 (1989). Government regulation often "curtails some potential

for the use or economic exploitation of private property," Andrus v. Allard, 444 U.S. 51, 65 (1979), and "not every destruction or injury to property by governmental action has been held to be a 'taking' in the constitutional sense," Armstrong v. United States, 364 U.S. 40, 49 (1960). ~~The process for evaluating~~ constitutionality involves an examination of the "justice and fairness" of the governmental action. See Andrus 444 U.S. at 65. The Federal Circuit has made such an examination, and has concluded that the Energy Policy Act assessment is similar to other assessments that have been upheld against taking and due process challenges. See Yankee Atomic, 112 F.3d at 1576 n.6.

In Yankee Atomic, the Federal Circuit noted that the Energy Policy Act assessment is designed to spread the costs associated with contamination on all domestic utilities that used the Government Services. Id. at 1575-76, 1580-82. Thus, it is not unlike other instances where Congress enacted legislation to spread societal costs. Id. at 1576 n.6. The Court referred to litigation involving the costs of cleaning up hazardous waste under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq. (1994), and noted that the defendants in those cases frequently challenged the retroactive application of CERCLA as a violation of their due process rights and as an unconstitutional taking. Id. "The courts, however, have rejected those arguments." Id. (citing United States v. Northeastern Pharmaceutical & Chemical Co., 810 F.2d 726, 734 (8th Cir. 1986) (rejecting due process

challenge because "Congress acted in a rational manner in imposing liability for the cost of cleaning up such sites upon those parties who created and profited from the sites and upon the chemical industry as a whole"), cert. denied, 484 U.S. 848 (1987).

Any assertion by plaintiffs that the Federal Circuit did not address constitutional contentions in Yankee Atomic is false. On appeal, Yankee Atomic argued both taking and due process bases for affirming the Court of Federal Claims. (Brief for Plaintiff/Cross-Appellant at 2, 38-41, filed April 16, 1996.) The Federal Circuit obviously rejected these arguments. The Federal Circuit resolved those issues by concluding that the Energy Policy Act assessment is similar to other constitutionally permissible legislation, and this Court is bound by that conclusion. See George v. United States, 30 Fed. Cl. 371, 375-77 (1994), aff'd, 90 F.3d 473 (1995).

III. THE EASTERN ENTERPRISES DECISION IS NOT DISPOSITIVE OF THE ISSUES IN THIS CASE

Referring to the Supreme Court's recent plurality opinion in Eastern Enterprises v. Apfel, 118 S. Ct. 2131 (1998), plaintiffs assert taking and due process violations based upon the allegedly severe, disproportionate, and extremely retroactive burden imposed by the Energy Policy Act assessment. (Compl. ¶¶ 1, 3.) Plaintiffs' reliance upon Eastern Enterprises is misplaced.

Eastern Enterprises is a plurality opinion. A plurality opinion represents "one of the fragmented opinion cases" in which

the justices adopted "three distinct approaches" to the question presented, "none of which enjoys the support of five justices." King v. Palmer, 950 F.2d 771, 782 (D.C. Cir. 1991) (en banc); see also Association of Bituminous Contractors, Inc. v. Apfel, 156 F.3d 1246, 1253-55 (D.C. Cir. 1998). In Eastern, four Justices (Justice O'Connor, joined by Chief Justice Rehnquist, Justice Scalia, and Justice Thomas) concluded that the Coal Act as applied to Eastern violated the Takings Clause, but expressly declined to decide Eastern's due process claim. Id. at 2146-53. Justice Kennedy concurred in the judgment holding the Coal Act unconstitutional because he thought its application to Eastern violated "settled due process principles," but he dissented from the plurality's Takings analysis." Id. at 2154-60 (Kennedy, J., concurring in the judgment and dissenting in part) (reasoning that general imposition of liability unrelated to a specific interest in property cannot constitute a taking). The four remaining Justices (Justice Breyer, joined by Justices Steven, Souter, and Ginsburg) agreed with Justice Kennedy that the Takings Clause does not apply, and also concluded that the Coal Act as applied to Eastern did not violate substantive due process. Id. at 2161-68 (Breyer, J., dissenting).

Under these circumstances, none of the three Eastern opinions can be viewed as representing the "controlling legal holding" of the case. See King v. Palmer, 950 F.2d at 784; Association of Bituminous Contractors, Inc. v. Apfel, 156 F.3d at 1253-55. Instead, only the result of Eastern is binding, and the

Coal Act should be held unconstitutional only as applied to companies that are substantially identical to Eastern. The instant case is factually distinguishable from Eastern.

Eastern Enterprises, as a coal operator, signed collective bargaining agreements, in effect between 1947 and 1964, that provided certain health care benefits to employees. Eastern Enterprises, 118 S. Ct. at 2142-43. Eastern ceased coal mining operations in 1965, transferring its coal-related operations and its liabilities for payments to benefit plans to another company. Id. The Coal Industry Retiree Health Benefit Act of 1992 ("Coal Act"), however, obligated Eastern to pay premiums to a "Combined Fund" created to cover the health care benefits for retirees from the coal industry. 26 U.S.C. § 9706(a)(3); Eastern, 118 S. Ct. at 2143. As a result of the Coal Act assessment, Eastern was required to pay premiums for more than 1,000 retired miners who had worked for the company before 1966.

The purpose of the Coal Act was to stabilize benefit plan funding and to provide lifetime health care benefits for retirees as promised in their collective bargaining agreements. Id. at 2142, 2149-52. Eastern, however, had made no such promises. Only the post-1965 collective bargaining agreements, to which Eastern was not a signatory, expressly referenced health benefits for retirees. Id. at 2139-40, 2149-52. Only the post-1965 agreements contained the industry-wide agreements to fund lifetime benefits that arguably served as a basis for the Coal Act. Id. Eastern's liability under the act bore no relation to

its experience under the benefit plans. Thus, the plurality held that the assessment as applied to Eastern was unconstitutional because it imposed a severe, disproportionate, and extremely retroactive burden on Eastern that was unrelated to any commitment made by Eastern. Id. at 2153.

In contrast, the Energy Policy Act assessment is not premised upon any promise made by plaintiffs. Indeed, plaintiffs assert the assessment runs counter to their contracts with the Government. As determined in Yankee Atomic, however, the assessment did not abrogate any of plaintiffs' contract-based rights, and thus does not upset long-settled transactions. Neither is the Energy Policy Act assessment disproportionate to plaintiffs' participation in or usage of the Government's uranium enrichment services. Rather, the assessment directly relates to the proportion of domestic utility enrichment services used by plaintiffs.

The Supreme Court plurality's concerns in Eastern were in part related to their belief that the Coal Act assessment upset long-settled commercial transactions, and imposed a disproportionate burden on those subject to the assessment. Review of the Federal Circuit's opinion in Yankee Atomic reveals the court found that the Energy Policy Act assessment did not breach, upset, or impair long-settled commercial transactions. 112 F.3d at 1576-80. Neither did the assessment impose a disproportionate burden on those subject to the assessment. Id. To find Eastern dispositive, this Court must disregard the

Federal Circuit's findings in Yankee Atomic. Of course, this Court is simply not free to do that.

**IV. THE ENERGY POLICY ACT ASSESSMENT DOES NOT EFFECT A
TAKING OF PROPERTY WITHIN THE MEANING OF THE FIFTH
AMENDMENT**

Count II of plaintiffs' complaint alleges that the Energy Policy Act's special assessment effects an unconstitutional taking of plaintiffs' property rights, and the government is liable to plaintiffs for just compensation. "A 'taking' occurs when the government exercises its proper contract, property or regulatory power to control property or rights which it does not acquire through purchase." Torres v. United States, 15 Cl. Ct. 212, 215 (1988). No such taking has occurred here. Plaintiffs have been required to pay money. They seek the return of that money, not "just compensation." Application of "takings" case law to the special assessment demonstrates that the assessment is a proper exercise of governmental power.

**A. The Takings Clause Does Not Apply When
Government Orders Payment of Money**

The Takings clause of the Fifth Amendment guarantees that private property shall not be taken for public use without just compensation. This provision was "designed to bar [the] Government from forcing some people alone to bear the public burdens which, in all fairness and justice, should be borne by the public as a whole." Armstrong v. United States, 364 U.S. 40, 49 (1960). "As its language indicates, . . . [the Takings Clause]

does not prohibit the taking of private property, but instead places a condition on the exercise that power." First English Evangelical Lutheran Church of Glendale v. County of Los Angeles, 482 U.S. 304, 314 (1987). The core concern lies not with ~~preventing arbitrary or unfair government action, but with~~ providing compensation for legitimate government action that takes "private property" to serve the public good. Id.

"Requiring money to be spent is not a taking of property." Atlas Corporation v. United States, 895 F.2d 745, 756 (Fed. Cir.) (citing United States v. Sperry Corp., 493 U.S. 52, 62 n.9 (1989)), cert. denied, 498 U.S. 811 (1990); see also Branch v. United States, 69 F.3d 1571, 1576-77 (Fed. Cir. 1995) (even though taxes and special municipal assessments indisputably "take" money, assessments of that kind are not treated as per se takings under the Fifth Amendment); Meriden Trust & Safe Deposit Co. v. Federal Deposit Ins. Corp., 62 F.3d 449, 455 n.2 (2d Cir. 1995) (per se takings analysis inapplicable to congressional imposition of monetary liability); cf. Webb's Fabulous Pharmacies, Inc. v. Beckwith, 449 U.S. 155, 163 (1980) (state appropriation of the interest on a fund deposited into court held to be a taking only after court concluded that there was not "any reasonable basis to sustain the taking of the interest").

In Atlas, which is quite similar to this case, the Federal Circuit considered breach of contract and takings claims raised by companies that had contracted with the Government to provide uranium ore for prices specified in various production contracts.

895 F.2d at 749. Congress had passed legislation that suddenly imposed upon those contractors massive costs necessary to stabilize and decommission the existing uranium mill sites. The contractors sought recovery of the costs associated with ~~complying with these new requirements, which had not been~~ mentioned in their completed contracts with the Government. The companies argued that their fixed price contracts with the United States had been designed to reimburse them for all reasonable costs associated with the production of uranium and thorium concentrate. *Id.* at 749-56. The Federal Circuit rejected those claims for a variety of reasons, including an express finding that the plaintiffs had not alleged a physical taking of any of their property. *Id.* at 756. The complaint alleged "only that [plaintiffs] will be required to spend sums of money for reclamation of tailing and mill decommissioning." *Id.*

Similarly, in United States v. Sperry Corp., 493 U.S. 52, 62 n.9 (1989), the Supreme Court determined that a deduction of a tribunal user fee from a settlement award was not a physical occupation requiring just compensation. As the Court reasoned,

[i]t is artificial to view deductions of a percentage of a monetary award as physical appropriations of property. Unlike real or personal property, money is fungible. No special constitutional importance attaches to the fact that the Government deducted its charge directly from the award rather than requiring Sperry to pay it separately. If the deduction in this case were a physical occupation requiring just compensation, so would be any fee for services, including a filing fee that must be paid in advance.

Id. This ruling is consistent with the policy that, as long as regulations do not require some manner of physical occupation, they will be analyzed under the multi-factor inquiry generally applicable to nonpossessory governmental activity. See Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 440 (1982) (citing Penn Central Transportation Co. v. New York City, 438 U.S. 104 (1978)).

Plaintiffs, however, simply assert a taking of their "property," presumably referring to the monetary assessments paid, and its "property rights," presumably referring to its rights to this money. This novel view that a governmental assessment of money, in and of itself, can constitute a taking is based upon the minority view in the Eastern Enterprises plurality opinion.

Until the plurality decision in Eastern Enterprises, one constant limitation in regulatory taking analysis has been that a specific property right or interest has been at stake. Eastern Enterprises, 118 S. Ct. at 2155 (Kennedy, J., dissenting). "The plurality's opinion disregards this requirement and, by removing this constant characteristic from takings analysis, would expand an already difficult and uncertain rule to a vast category of cases not deemed, in our law, to implicate the Takings Clause."

Id. Justice Kennedy concluded that "[t]o call this sort of governmental action a taking as a matter of constitutional interpretation is both imprecise and, with all due respect, unwise." Id. at 2154.

Justice Breyer, joined in his dissent by three Justices, agreed with Justice Kennedy that the Takings Clause did not apply. "This case involves, not an interest in physical or intellectual property, but an ordinary liability to pay money, and not to the Government, but to third parties." Id. at 2161-62 (Breyer, J., dissenting).

Thus, five of the nine Justices found the Takings Clause not to apply when the Government simply orders the payment of money. Until such time as a majority of the Supreme Court agrees on this issue, the novel application of the Takings Clause by four Justices is simply insufficient to overturn valid and binding Federal Circuit precedent against employing the Takings Clause in this manner. See Association of Bituminous Contractors, Inc. v. Apfel, 156 F.3d at 1253-55; King v. Palmer, 950 F.2d at 784.

B. The Assessment Does Not Constitute a Regulatory Taking

A taking by regulation (or, as appropriate, legislation) may occur if the government, by placing burdens on property owners, goes "too far" in interfering with rights incident to property ownership. Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 415 (1922). The Energy Policy Act assessment simply does not interfere with any right incident to property ownership. Nevertheless, analysis of the assessment under regulatory taking case law reveals that the assessment is constitutionally permissible.

The Energy Policy Act assessment is quite similar to other

legislation that the courts have found not to effect a regulatory taking. For example, in Connolly v. Pension Benefit Guar. Corp., 475 U.S. 211 (1986), the Supreme Court reviewed a challenge to legislation that required employers withdrawing from a ~~multiemployer pension plan to pay a fixed debt to the plan~~ amounting to the employer's proportionate share of the plan's unfunded vested benefits. The Court acknowledged that these withdrawal liability provisions "permanently deprived" employers of the "assets necessary to satisfy [their] statutory obligation." 475 U.S. at 222. Nonetheless, the Court rejected a Takings clause challenge to the withdrawal liability provisions, and explained that the fact that a statute requires the payment of a large amount of money or imposes a "real" and "not insubstantial" "debt that the employer must satisfy" does not mean that the statute effects a "taking." Id. Accord Concrete Pipe & Products of Calif., Inc. v. Construction Laborers Pension Trust for S. Calif., 508 U.S. 602, 641-43 (1993) (rejecting taking challenge to employer withdrawal liability provisions brought by employer whose withdrawal liability equaled "46% of shareholder equity").

As the Supreme Court explained, "[i]n the course of regulating commercial and other human affairs, Congress routinely creates burdens for some that directly benefit others." Connolly, 475 U.S. at 223. "Given the propriety of the governmental power to regulate, it cannot be said that the Taking Clause is violated whenever legislation requires one person to

use his or her assets for the benefit of another." Id.

Legislation readjusting rights and burdens is not unlawful solely because it upsets otherwise settled expectations. Id. (citing Usery v. Turner Elkhorn Mining Co., 428 U.S. 1, 15-16 (1976)).

"This is true even though the effect of the legislation is to impose a new duty or liability based on past acts." Usery v. Turner Elkhorn Mining Co., 428 U.S. at 15-16. The Supreme Court has upheld numerous statutory provisions even though they upset settled expectations based on prior contracts, and impose a new duty or liability based on past acts. See, e.g., Concrete Pipe & Products of Calif., Inc. v. Construction Laborers Pension trust for S. Calif., 508 U.S. 602 (1993).

Congress's action here in assigning liability to plaintiffs and other domestic utilities that participated in the uranium enrichment field is plainly permissible. The Supreme Court has made clear that "[i]t is surely proper for Congress to legislate retrospectively to ensure that costs of a program are borne by the entire class of persons that Congress rationally believes should bear them." United States v. Sperry Corp., 493 U.S. at 65; Accord United States v. Monsanto Corp., 858 F.2d 160, 173-74 (4th Cir. 1988), cert. denied, 490 U.S. 1106 (1989) (upholding assignment liability to industry for cleanup costs under CERCLA); United States v. Northeastern Pharmaceutical and Chemical Co., 810 F.2d 726, 734 (8th Cir. 1986), cert. denied, 484 U.S. 848 (1987) (same); Washington Star Co. v. International Topographical Union Negotiated Pension Plan, 729 F.2d 1502, 1510-11 (D.C. Cir.

1984).

The fundamental question is whether the Energy Policy Act assessment is unfair or unjust. It is not. Here, Congress is assigning a portion of cleanup costs to the domestic utility industry based on the domestic utility industry's use of government uranium enrichment services.^{1/} As the Supreme Court has stated, a governmental body has an obvious interest in making those who specifically benefit from its services pay the costs. United States v. Sperry Corp., 493 U.S. at 63 (citing Massachusetts v. United States, 435 U.S. 444, 462 (1978)). plaintiffs' assessment is directly proportional to their usage of domestic utility uranium enrichment services. To arrive at this proportion, of course, Congress had to look back over the course of years that it provided such services. It was rational, and fair, for Congress to consider the totality of circumstances; to consider the participants in the industry when dealing with an industry-wide problem — and to consider those benefitting from the fruits of industrial activity when deciding who should bear the burden of correcting the problem.

The imposition of liability for the remediation of

^{1/} Foreign utility usage is excluded from this calculation and in no way increases or otherwise affects plaintiffs' proportion of domestic utility usage. In fact, foreign utility usage, as part of the total against which the domestic percentage is calculated, serves to limit the percentage of domestic utility industry liability to its percentage of usage. In any event, the failure to impose an assessment on foreign utilities does not render plaintiffs' allocation disproportionate. Neither plaintiffs nor any other domestic utility is being assessed for foreign utility usage.

contamination bred in the past is justified as a rational measure to spread the costs of remediation to those who have profited from the fruits of government uranium enrichment services. See Usery v. Turner Elkhorn Mining Co., 428 U.S. at 18 (the ~~imposition of liability for the effects of disabilities bred in~~ the past is justified as a rational measure to spread the costs of the employees disabilities to those who have profited from the fruits of their labor). This is true even if the effect of the legislation is to impose a new duty or liability based on past acts. Id. at 16.

V. THE ASSESSMENT DOES NOT VIOLATE SUBSTANTIVE DUE PROCESS

As were its takings arguments, plaintiffs' due process arguments are without merit. The Due Process Clause provides that no person shall be "deprive[d] . . . of life, liberty, or property, without due process of law. U.S. Const. Amend. XIV, §1. It safeguards citizens from arbitrary or irrational decisions. Thus, to succeed, plaintiffs must establish that their liability under the Energy Policy Act is arbitrary and irrational. Usery v. Turner Elkhorn Mining Co., 428 U.S. at 15. The allegations of its complaint fail to do so as a matter of law.

Plaintiffs' assertion that the special assessment is unconstitutional because it imposes financial obligations upon entities that are not responsible for the problem underlying the legislation, or because it is based upon conduct excessively far

into the past, are without merit. It is "well established that legislative Acts adjusting the burdens and benefits of economic life come to the Court with a presumption of constitutionality, and that the burden is on one complaining of a due process violation to establish that the legislature has acted in an arbitrary and irrational way." Usery v. Turner Elkhorn Mining Co., 428 U.S. at 15. That presumption is not overcome by the mere fact that legislation has "upset[] otherwise settled expectations," or that "the effect of the legislation is to impose a new duty or liability based on past acts." Id. at 16. As long as the legislation's retrospective aspects are supported by separate rational justifications, a statute's retroactivity does not implicate due process concerns.

In enacting the Energy Policy Act, Congress rationally concluded that the cost of decontaminating and decommissioning the uranium enrichment plants that had supplied enrichment services to domestic utilities since the 1950s should be shared by all of the participants in the relevant market, including the government and those utilities that used the enriched uranium to produce electricity for their retail customers. Pursuant to the Act, the government pays more than 68% of the total decontamination and decommissioning expense. 42 U.S.C. 2297g-1. Moreover, unlike the government's contribution under the Act, the utilities' contribution is subject to an annual cap, 42 U.S.C. 2297g-1(c), and an aggregate cap, 42 U.S.C. 2297g-1(e). That approach was supported by representatives of the domestic nuclear

utility industry, including an association of which petitioner was a member. See Comprehensive National Energy Policy Act: Hearing Before the House Comm. on Ways and Means, 102d Cong., 2d Sess. 178-83 (1992).

Under these circumstances, it cannot be said that Congress acted arbitrarily and irrationally in requiring that those using and benefitting from the Government's uranium enrichment facilities, like plaintiffs, make pro rata contributions toward the cost of closing and decontaminating those facilities. Plaintiffs' complaint presents nothing that overcomes the Energy Policy Act's presumption of constitutionality or justifies any second-guessing of Congress's policy judgment. The fact that the DOE once used fixed-price contracts to sell enrichment services to plaintiffs simply has no bearing on the issue of whether Congress had a rational basis for deciding to spread the cost of the decontamination and decommissioning among the participants in the transactions that necessitated those expenses.

In United States v. Carlton, 512 U.S. 26 (1994), the Court upheld retroactive application of the federal estate tax. While there the retroactive application was only slightly greater than a year, the Court stated:

The due process standard to be applied to tax statutes with retroactive effect, therefore, is the same as that generally applicable to retroactive economic legislation:

"Provided that the retroactive application of a statute is supported by a legitimate legislative purpose furthered by rational means, judgments about the wisdom of such legislation remain within the

exclusive province of the legislative and executive branches . . .

"To be sure, . . . retroactive legislation does have to meet a burden not faced by legislation that has only future effects . . . 'The retroactive aspects of legislation, as well as the prospective aspects, must meet the test of due process, and the justifications ~~for the latter may not suffice for the former~~' . . . But that burden is met simply by showing that the retroactive application of the legislation is itself justified by a rational legislative purpose."

512 U.S. at 30-31 [citations omitted]. Here, the special assessment was supported by the industry itself -- as a way of apportioning the tax on the basis of services rendered. See, e.g., Comprehensive National Energy Policy Act: Hearings Before the House Comm. on Ways and Means, 102d Cong., 2d Sess. 181 (1992). This effort at fairness proposed by the entities to be taxed is clearly a sufficient "rational legislative purpose."

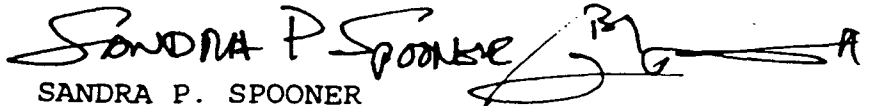
CONCLUSION

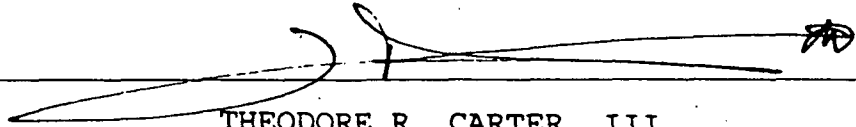
For the foregoing reasons, defendant United States of America respectfully requests that the Court dismiss plaintiffs' complaint.

Respectfully submitted,

FRANK W. HUNGER
Assistant Attorney General

J. CHRISTOPHER KOHN
Director


SANDRA P. SPOONER
Deputy Director



THEODORE R. CARTER, III
Senior Trial Counsel
Commercial Litigation Branch
Civil Division
Department of Justice
P.O. Box 875, Ben Franklin Station
Washington, D.C. 20044
Tele: (202) 307-3242
Attorneys for Defendant

January 8, 1999

Enron Memos Q&A

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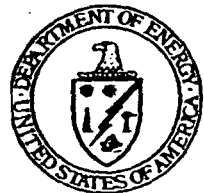
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Department of Energy

Washington, DC 20585

October 30, 1996

*Chair
Enron
E.E. Felt*

Honorable Elizabeth A. Moler, Chair
Federal Energy Regulatory Commission
Office of the Chair
Room 11A
888 First Street, N.E.
Washington, D.C. 20426

Dear Chair Moler:

On October 29, 1996, Secretary O'Leary signed Delegation Order No 0204-163, which delegated and assigned to the Federal Energy Regulatory Commission (Commission) authority to carry out functions vested in the Secretary to regulate access to, and the rates, terms and conditions for, transmission services over facilities owned, controlled, or operated by the El Paso Electric Company (EPE) and covered by Presidential Permits PP-48-3 and PP-92.

This authority is delegated to the Commission for the purpose of authorizing the Commission to take any actions necessary to effectuate open access transmission over the United States portion of EPE's electric transmission lines connecting the Diablo and Ascaraté substations in the United States with the Insurgentes and Riverena substations in Mexico.

Copies of the Delegation Order and the Federal Register notice of its issuance are enclosed. The delegation is effective upon publication, which is expected to be on Friday, November 1.

Sincerely,

Robert R. Nordhaus
General Counsel

Enclosures

cc: Commissioner Vicky A. Bailey
Commissioner James J. Hoecke
Commissioner William L. Massey
Commissioner Donald F. Santa, Jr.



[6450-01-P]

DEPARTMENT OF ENERGY

OFFICE OF THE SECRETARY

FEDERAL ENERGY REGULATORY COMMISSION

~~RELATING TO CERTAIN AUTHORIZATIONS TO EXPORT ELECTRICITY~~
AND CONSTRUCT AND OPERATE RELATED FACILITIES.

AGENCY: Department of Energy

ACTION: Notice of Delegation and Assignment

SUMMARY: Notice is hereby given of the delegation and assignment by the Secretary of Energy to the Federal Energy Regulatory Commission of the authority to carry out functions vested in the Secretary relating to certain authorizations issued by the Secretary to construct, operate, maintain or connect border transmission facilities and to transmit electricity to a foreign country.

EFFECTIVE DATE: [date of publication]

FOR FURTHER INFORMATION CONTACT: Anthony J. Como, Department of Energy, Office of Fossil Energy. Telephone: (202) 586-9624.

SUPPLEMENTARY INFORMATION:

The Secretary of Energy (Secretary) has the authority under the Department of Energy Organization Act (DOE Act) (Pub. L. 95-91) to approve or disapprove applications to transmit

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electricity to a foreign country pursuant to section 202(e) of the Federal Power Act (16 U.S.C. 824a(e)). Moreover, the Secretary has the authority to approve or disapprove applications to construct, operate, maintain, or connect transmission facilities at the border between the United States and a foreign country pursuant to Executive Order 10485 as amended by Executive Order 12038.

Both of these functions were originally vested in the Federal Power Commission. Subsection 301(b) of the DOE Act transferred to, and vested in, the Secretary all the functions of the Federal Power Commission not specifically vested by the DOE Act in the Federal Energy Regulatory Commission (Commission). Sections 401-407, 503, and 504 of the DOE Act set forth the jurisdiction and authority of the Commission, an independent body within the Department of Energy (DOE). The Federal Power Commission's functions with respect to transmission of electricity to a foreign country and transmission facilities at the border were not specifically vested in the Commission. Furthermore, subsection 402(f) of the DOE Act provides that no function vested in the Commission which regulates the export or import of electricity shall be within the jurisdiction of the Commission unless the Secretary assigns such a function to the Commission.

As a general matter, section 642 of the DOE Act permits the Secretary to delegate any of the Secretary's functions to any officer or employee of the Department the Secretary may designate, including the Commission. More specifically, the Secretary's authority to regulate exports of electricity may be assigned in whole or in part to the Commission under subsections 402(e) and (f) of the DOE Act, after public notice of the assignment.

Pursuant to these provisions of the DOE Act, public notice is hereby given that the Secretary delegates and assigns to the Commission the authority to carry out certain functions vested in the Secretary. The assignment is in the form of a delegation.

The Commission, on October 4, 1996, issued an order in FERC Docket No. EL96-74-000 responding to a request from Enron Power Marketing, Inc. (EPMI) for transmission access across transmission facilities of El Paso Electric Company (EPE). In that order, the Commission required EPE to comply with its open access tariff by providing EPMI with transmission service from EPMI's designated points of receipt on EPE's transmission system to EPE's Diablo and Ascarate substations near the United States-Mexico border. The Commission further concluded that the Secretary has the jurisdiction, under section 202(e) of the Federal Power Act (FPA) and under the Executive Orders authorizing issuance of Presidential Permits for construction, operation, maintenance or connection of border facilities, to act on requests for transmission access over the U.S. portion of the lines connecting the Diablo and Ascarate substations in the United States with the Insurgentes and Riverena substations in Mexico.

In its Order No. 888, the Commission required open and comparable transmission access across the transmission lines of public utilities in order to promote competition. The Commission's October 4 order found a gap in the Commission's authority to require open access directly to the border of the United States with Mexico. As a matter of policy, the Department strongly supports the emergence of a more competitive wholesale electricity market and considers open and comparable transmission access a critical factor in creating and sustaining a competitive market, and thus the Department supports the Commission's policy in this area. Because the

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Commission, under its current jurisdiction, regulates transmission access and the rates, terms and conditions of transmission service for most of the transmission facilities owned by EPE, and to permit uniform implementation of the Commission's open access policy, the Department has concluded that the Commission is the most appropriate agency to address the transmission access

and related regulatory issues with respect to the EPE border facilities. Accordingly, the Secretary is delegating to the Commission her authority under the Federal Power Act and Executive Order 10485, as amended by Executive Order 12038, to modify or condition EPE's Presidential Permits for its border facilities (DOE Docket No. PP-48-3 and PP-92) or EPE's authorization to export (DOE Docket No. EA-48-I) or both to provide for third-party access to transmission service over the facilities covered by the Presidential Permits, and to regulate the rates, terms and conditions for such service. Specifically, the delegation order authorizes the Commission to impose terms and conditions, and to issue such supplemental orders, as the Commission deems necessary and appropriate in the following DOE dockets:

El Paso Electric Company

DOE Docket No. PP-48-3 -- Presidential Permit

DOE Docket No. PP-92 -- Presidential Permit

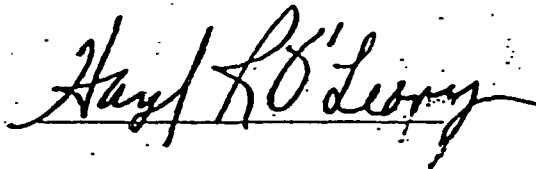
DOE Docket No. EA-48-I -- Export Authorization

The delegation amends to this limited extent, but does not otherwise rescind or supersede, the Secretary's prior delegation of authority to regulate exports of electricity to the Assistant Secretary for Fossil Energy (DOE Delegation Order No. 0204-127, February 7, 1989),

subdelegated to the Director of the Office of Coal and Electricity (Delegation Order dated September 24, 1993).

~~DOE has issued export authorizations to four entities (other than EPE), including EPMI,~~
that authorize export over EPE's border facilities. Further applications from other parties for authorization to export over these facilities may be received. DOE will retain its jurisdiction over these authorizations, and will consider making modifications, if necessary, to reflect any action taken by the Commission with regard to this matter.

Issued in Washington, D.C. on October 29, 1996.



Hazel R. O'Leary

Secretary

Certified to be a true
copy of the original


Certifying Officer

586-8705

DEPARTMENT OF ENERGY

DELEGATION ORDER NO. 0204-163

TO THE FEDERAL ENERGY REGULATORY COMMISSION

Pursuant to the authority vested in me as the Secretary of Energy (Secretary) by sections 642 and 402(e) of the Department of Energy Organization Act (Pub. L. 95-91) (DOE Act), there is hereby delegated and assigned to the Federal Energy Regulatory Commission (Commission) the authority to carry out such functions as are vested in the Secretary to regulate access to, and the rates, terms and conditions for, transmission services over facilities owned, controlled or operated by the El Paso Electric Company and covered by Presidential Permits PP-48-3 and PP-92.

In exercising the authority delegated by this Order the Commission is specifically authorized to modify, revoke, or attach terms and conditions to Presidential Permits PP-48-3 and PP-92 and Export Authorization EA-48-I under Executive Order 10485, as amended by Executive Order 12038, and section 202(e) of the Federal Power Act (FPA) and such other sections of the FPA vested in the Secretary as may be relevant, and to issue such supplemental orders in these dockets, as the Commission finds necessary and appropriate to the public interest. This authority is delegated to the Commission for the sole purpose of authorizing the Commission to take actions necessary, if any, to effectuate open access transmission over the United States portion of the lines connecting the Diablo and Ascarate substations in the United States with the Insurgentes and Riverena substations in Mexico.

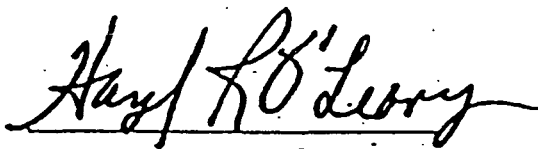
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The authority delegated to the Commission may be further delegated within the Commission, in whole or in part, as may be appropriate.

All actions taken pursuant to authority delegated prior to this Order or pursuant to any authority delegated by this Order taken prior to and in effect on the date of this Order are hereby confirmed and ratified, and shall remain in full force and effect as if taken under this Order, unless and until rescinded, amended, or superseded.

Nothing in this Order shall preclude the Secretary from exercising or further delegating any of the authority hereby delegated, whenever, in the Secretary's judgment, the exercise or further delegation of such authority is necessary or appropriate to administer the functions vested in the Secretary.

This Order is effective on [date of publication in the Federal Register].



Secretary of Energy

Copy file

October 23, 1996

MEMORANDUM FOR:

Douglas Smith (GC-70)
Deputy General Counsel
For Energy Policy

FROM:

Michael T. Skinker
Staff Attorney

SUBJECT:

DRAFT LEGAL MEMO RE ELECTRICITY EXPORTS

Here is a draft copy of the legal memo you requested to supplement the outline I provided. It is certainly not as polished as I would like due to the time constraints. Jim has not reviewed it. Please let me know what you would like me to do. I have a couple of important and time-consuming clean coal projects that require attention.

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Copies of the memo have been provided to Bonnie Suchman and FE for comments.

PRIVILEGED AND CONFIDENTIAL
ATTORNEY WORK PRODUCT
DRAFT #2--October 23, 1996

MEMORANDUM FOR: ~~Doug Smith(GC-70)~~
Associate General Counsel
For Energy Policy

THROUGH: James K. White (GC-40)
Assistant General Counsel
Fossil Energy

FROM: Michael T. Skinker
Staff Attorney

SUBJECT: Legal Authority For DOE To Require Comparable Open Access
Over International Electric Lines

filed

¹ Order On Complaint, Enron Power Marketing, Inc. v. El Paso Electric Company, Docket No. EL96-74-000 (October 4, 1996).

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² Federal Power Act, 16 U.S.C. 791a-825r.

³ Department of Energy Organization Act, P.L. 95-91, 42 U.S.C. 7101 (1977).

⁴ "The Parties recognize that it is desirable to strengthen the important role that trade in energy and basic petrochemical goods plays in the free trade area and to enhance this role through sustained and gradual liberalization." The Parties also recognize "the importance of having viable and internationally competitive energy and petrochemical sectors to further their individual national interests." Chapter 6, North American Free Trade Agreement.

⁵ Energy Policy Act of 1992, P.L. 102-486, 106 STAT. 2776, 42 U.S.C. 13201 note (10/24/92).

⁶ Paragraph (F) of the EPE export authorization requires EPE to conduct "all operations pursuant to the authorization hereby granted in accordance with the provisions of the Federal Power Act and pertinent rules, regulations or orders adopted or issued by the DOE." (Emphasis added).

⁷ I question whether the Secretary's authority to delegate the President's permitting authority of the Executive Orders pursuant to the Congressional authority of §642 of the DOE Act. The better view is that redelegation of the permit authority is allowed by the terms of the EO itself because there is no prohibition on redelegation.

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⁸ The Analysis Section of the Order also provided that "the issue of FERC jurisdiction and authority to order retail wheeling is not relevant or a part of this DOE proceeding. Also, the issue of DOE's authority to order transmission service is not relevant, because that is not being done in this proceeding."

authorization (Order EA-48-1) and Presidential Permits (PP-48-3 & PP-92), and EPMI's export authorization in Order EA-102.

III. DISCUSSION

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ATTACHMENT

RELEVANT PROVISIONS

STATUTES AND EXECUTIVE ORDER 10485

DOE ACT

~~TITLE III--TRANSFERS OF FUNCTIONS~~

GENERAL TRANSFERS

Sec. 301 (a) Except as otherwise provided in this Act, there are hereby transferred to, and vested in, the Secretary all of the functions vested by law in the Administrator of the Federal Energy Administration or the Federal Energy Administration, the Administrator of the Energy Research and Development Administration or the Energy Research and Development Administration; and the functions vested by law in the officers components of either such Administration.

(b) Except as provided in title IV, there are hereby transferred to, and vested in, the Secretary the function of the Federal Power Commission, or of the members, officers, or components thereof. The Secretary may exercise any power described in section 402(a)(2) to the extent Secretary determines such power to be necessary to the exercise of any functions within his jurisdiction pursuant to the preceding sentence.

JURISDICTION OF THE COMMISSION

Sec. 402. (a)(1) There are hereby transferred to, and vested in, the Commission the following functions of the Federal Power Commission or of any member of the Commission or any officer or component of the Commission:

(B) the establishment, review, and enforcement of rates and charges for the transmission or sale of electric energy, including determinations on construction work in progress, under part II of the Federal Power Act, and the interconnection, under section 202(b), of such Act, of facilities for the generation, transmission, and sale of electric energy (other than emergency interconnection);

402(a)(2) The Commission may exercise any power under the following sections to the extent the Commission determines such power to be necessary to the exercise of any function within the jurisdiction of the Commission:

(A) sections 4, 301, 302, 306 through 309, and 312 through 316 of the Federal Power Act; and

(B) sections 8, 9, 13 through 17, 20, and 21 of the Natural Gas Act.

402(d) The Commission shall have jurisdiction to hear and determine any other matter arising under any other function of the Secretary--

(1) involving any agency determination required by law to be made on the record after an opportunity for agency hearing; or

(2) involving any other agency determination which the Secretary determines shall be made on the record after an opportunity for an agency hearing, except that nothing in this subsection shall require that functions under 105 and 106 of the Energy Policy and Conservation Act shall be within the jurisdiction of the Commission unless the Secretary assigns such a function to the Commission.

(e) In addition to the other provisions of this section, the Commission shall have jurisdiction over any other matter which the Secretary may assign to the Commission after public notice, or which are required to be referred to the Commission pursuant to section 404 of this Act.

(f) No function describe in this section which regulates the exports or imports of natural gas or electricity shall be within the jurisdiction of the Commission unless the Secretary assigns such a function to the Commission.

PART C--GENERAL ADMINISTRATIVE PROVISIONS

DELEGATION

Section 642. Except as otherwise expressly prohibited by law, and except as otherwise provided in this Act, the Secretary may delegate any of his functions to such officers and employees of the Department as he may designate, and may authorize such successive redelegations of such functions within the Department as he may deem to be necessary or appropriate.

FEDERAL POWER ACT

PART II--REGULATION OF ELECTRIC UTILITY COMPANIES ENGAGED IN INTERSTATE COMMERCE

DECLARATION OF POLICY; APPLICATION OF PART; DEFINITIONS

Sec. 201(c). For the purpose of this Part, electric energy shall be held to be transmitted in interstate commerce if transmitted from a State and consumed at any point outside thereof: but only insofar as such transmission takes place within the United States.

(e) The term "public utility" when used in this Part or in the Part next following means any person who owns or operates facilities subject to the jurisdiction of the Commission under this Part (other than facilities subject to such jurisdiction solely by reason of section 210, 211, or 212).

(f) No provision in this Part shall apply to, or be deemed to include, the United States, a State or any political subdivision of a state, or any agency, authority, or instrumentality of any one or more of the foregoing, or any corporation which is wholly owned, directly or indirectly, by any one or more of the foregoing, or any officer, agent, employee of any of the foregoing acting as such in the course of his official duty, unless provision makes specific reference thereto.

INTERCONNECTION AND COORDINATION OF FACILITIES; EMERGENCIES; TRANSMISSION TO FOREIGN COUNTRIES

Sec. 202(e). After six months from the date on which this Part takes effect, no person shall transmit any electric energy from the United States to a foreign country without first having secured an order of the Commission authorizing it to do so. The Commission shall issue such order upon application unless, after opportunity for hearing, it finds that the proposed transmission would impair the sufficiency of electric supply within the United States or would impede or tend to impede the coordination in the public interest of facilities subject to the jurisdiction of the Commission. The Commission may by its order grant such application in whole or in part, with such modifications and upon such terms and conditions as the Commission may find necessary or appropriate, and may from time to time, after opportunity for hearing and for good cause shown, make such supplemental orders in the premises as it may find necessary or appropriate.

(f) The ownership or operation of facilities for the transmission or sale at wholesale of electric energy which is (a) generated within a State and transmitted from that State across an international boundary and not thereafter transmitted into any other State, or (b) generated in a foreign country and transmitted across an international boundary into a State and not thereafter transmitted into any

other State, shall not make a person a public utility subject to regulation as such under other provisions of this part. The State within which any such facilities are located may regulate any such transaction insofar as such State regulation does not conflict with the exercise of the Commission's powers under or relating to subsection 202(e)

RATE AND CHARGES; SCHEDULE; SUSPENSION OF NEW RATES

Sec. 205(a). All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful

**FIXING RATES AND CHARGES; DETERMINATION OF COST OF
PRODUCTION OR TRANSPORTATION**

Sec. 206(a). Whenever the Commission, after a hearing had upon its own motion or upon complaint, shall find that any rate, charges, or classification demanded, observed, charged or collected by any public utility for any transmission or sale subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order.

CERTAIN WHEELING AUTHORITY

Sec. 211. (a) Any electric utility, Federal power marketing agency, or any other person generating electric energy for sale for resale, may apply to the Commission for an order under this subsection requiring a transmitting utility to provide transmission services (including any enlargement of transmission capacity necessary to provide such services) to the applicant. Upon receipt of such application, after public notice and notice to each affected State regulatory authority, each affected electric utility, and each affected Federal power marketing agency, and after affording an opportunity for an evidentiary hearing, the Commission may issue such order if it finds that such order meets the requirements of section 212, and would otherwise be in the public interest. No order may be issued under this subsection unless the applicant has made a request for transmission services to the transmitting utility that would be the subject of such order at least 60 days prior to its filing of an application for such order.

(b) **RELIABILITY OF ELECTRIC SERVICE.** - No order may be issued under this section or section 210 if, after giving consideration to consistently applied regional or national reliability standards, guidelines, or criteria, the Commission finds that such order would unreasonably impair the continued reliability of electric systems affected by the order.

EXECUTIVE ORDER 10485

**PROVIDING FOR THE PERFORMANCE OF CERTAIN FUNCTIONS HERETOFORE
PERFORMED BY THE PRESIDENT WITH RESPECT TO ELECTRIC POWER AND
NATURAL GAS FACILITIES LOCATED ON THE BORDERS OF THE UNITED STATES.**

WHEREAS Section 202(e) of the Federal Power Act, as amended, 49 Stat. 847 (16 U.S.C. 824(e)), requires any person desiring to transmit any electric energy from the United

States to a foreign country to obtain an order of the Federal Power Commission authorizing it to do so; and....

WHEREAS the proper conduct of the foreign relations of the United States requires that executive permission be obtained for the construction and maintenance at the borders of the United States of facilities for the exportation or importation of electric energy and natural gas; and....

NOW, THEREFORE, by virtue of the authority vested in me as President of the United States and Commander in Chief of the armed forces of the United States, it is hereby ordered as follows:

SECTION 1. (a) The Federal Power Commission is hereby designated and empowered to perform the following-described functions:

(1) To receive all applications for permits for the construction, operations, maintenance, or connection, at the borders of the United States, of facilities for the transmission of electric energy between the United States and a foreign country.....

(3) Upon finding the issuance of the permit to be consistent with the public interest, and, after obtaining the favorable recommendations of the Secretary of State and the Secretary of Defense thereon, to issue to the applicant, as appropriate, a permit for such construction, operation, maintenance, or connection. The Commission shall have the power to attach to the issuance of the permit and to the exercise of the rights granted thereunder such conditions as the public interest may in its judgment require....

SEC. 4. All Presidential Permits heretofore issued pursuant to Executive Order No. 8202 of July 13, 1939, and in force at the time of the issuance of this order, and all permits issued thereunder, shall remain in full force and effect until modified or revoked by the President or by the Federal Power Commission.

Am. Electric Power

**Review of Center for Clean Air Policy's Paper Entitled:
"Emission Impacts of Increased Energy Exports
From the American Electric Power (AEP) System"**

PUTNAM, HAYES & BARTLETT, INC.

ECONOMIC AND MANAGEMENT COUNSEL

**Review of Center for Clean Air Policy's Paper Entitled:
"Emission Impacts of Increased Energy Exports
From the American Electric Power (AEP) System"**

Prepared by
Putnam, Hayes & Bartlett, Inc.

12 April 1996

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Review of Center for Clear Air Policy's Paper Entitled: "Emission Impacts of Increased Energy Exports from the American Electric Power (AEP) System"

INTRODUCTION AND CONCLUSIONS

Deregulation of the electric utility industry is currently being debated by a wide spectrum of constituencies with a variety of opinions and perspectives. Within the electric utility industry, there are significant concerns being raised by some utilities about recovery of stranded costs associated primarily with high-cost nuclear generation and purchased power requirements from PURPA qualifying facilities. Environmentalists are concerned about the possibility of increased generation from low-cost, coal-fired midwestern power plants, resulting in additional emissions that may adversely affect the environment, particularly in the northeastern United States. Finally, the federal and state governments are grappling with a serious ozone non-attainment problem in several major metropolitan areas of the United States.

The federal and state governments are currently involved in a constructive process to determine the best control strategy to deal with ozone non-attainment areas, which are principally located in heavily populated, urban areas. Electric utility emissions may contribute to ozone non-attainment in areas distant from the power plants where the emissions originate. The degree to which these emissions affect other areas, and their relative contribution compared to motor vehicle emissions and other stationary source emissions, needs to be determined in an objective manner. The National Ozone Transport Assessment Program has been created to do just that. The modeling analyses performed under this program are expected to provide policy makers with the basis for establishing appropriate emission controls on sources contributing to ozone formation in the non-attainment areas.

Putnam, Hayes & Bartlett, Inc. (PHB) was asked by American Electric Power (AEP) to review the Center for Clean Air Policy's (Center's) discussion paper, "Emission Impacts of Increased Energy Exports from the American Electric Power (AEP) System" (February 2, 1996, draft). In that paper, which is an attachment to the Center's comment package on the Federal Energy Regulatory Commission's (FERC's) draft Environmental Impact Statement,¹ the Center asserts that competition in the electric power industry fostered by FERC's proposed Open Access Rule (NOPR) will make existing midwestern coal-fired plants such as AEP's the "electricity source of choice." The Center also asserts that since midwestern utilities such as AEP have excess capacity and less stringent environmental regulations for nitrogen oxides (NO_x), the FERC NOPR will lead to increased electricity exports into the Northeast and to increased NO_x emissions from midwestern utilities. Finally, the Center implies that the increased NO_x emissions from midwestern utilities such as AEP will be carried downwind into the Northeast where they could increase ground-level ozone concentrations and make it more difficult for the states in the Northeast to attain ground-level federal ozone standards.

¹

Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities (RM95-8-000) and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities (RM94-001), Federal Energy Regulatory Commission, November 1995.

The basis for the Center's conclusions is an analysis that uses AEP as a proxy for midwestern utilities and estimates the amount and cost of the additional AEP coal-fired electric energy that the Center believes could be physically generated in the future. The Center asserts that the cost for this additional energy delivered to New York will be less than the future "spot market price" for energy in New York. This leads the Center to conclude that as a result of FERC's NOPR, midwestern utilities such as AEP would export a substantial amount of additional coal-fired energy to the Northeast and, as a consequence, NO_x emissions from midwestern utilities would increase.

The results of PHB's analysis are intended to clarify the key issues which need to be addressed in order to provide a more comprehensive review of the potential environmental impacts that could result from the implementation of FERC's NOPR. Based on our review, we have reached the following conclusions with respect to the Center's study:

1. The Center overestimates the additional coal-fired AEP energy that could be generated for resale, by:
 - a. Using a 1994 resource plan that is substantially different from AEP's current resource plan.
 - b. Incorrectly assuming that it would be economical for AEP to refurbish coal-fired generating units and operate these units as "merchant plants."
2. Even assuming that additional coal-fired energy from midwestern utilities such as AEP could be generated and transmitted to New York, PHB's analysis indicates that the sale of this additional energy would, in many instances, probably be uneconomic. This is because the Center's study:
 - a. Does not account for the cost of transmission losses incurred in wheeling the additional coal-fired generation from the Midwest to New York.
 - b. Overstates the likely price of energy in New York by incorrectly projecting future electricity prices in the New York Power Pool (NYPP).
 - c. Fails to examine whether competition will allow other utilities located outside of the Midwest to deliver electricity to the New York market at a lower cost.
 - d. Understates the additional cost to the midwestern utilities of offsetting the incremental NO_x emissions that are assumed to result from FERC's NOPR.

3. The Center fails to estimate correctly the quantity of additional electric energy from midwestern utilities that could be physically transmitted to New York. This is a critical failure since the amount of additional energy assumed by the Center to be transmitted to New York from the AEP system alone would require a significant increase in the existing transfer capability of the transmission grid connecting the midwestern utilities to New York.
4. The Center neither addresses the possibility that FERC's NOPR could result in the construction of additional gas-fired, combined cycle generating capacity, both in the Midwest and the Northeast, nor comments on whether the NOPR would stimulate the development of additional gas-based technologies such as fuel cells and small-scale, gas-fired cogeneration plants. Increased electricity generation from these gas-fired technologies has the potential to reduce overall emissions of NO_x.

PHB believes that as a result of the above factors, the Center overestimates the incremental NO_x emissions that could occur at midwestern utilities such as AEP due to FERC's NOPR. In fact, given the limitations of the Center's analysis, it is not possible for the Center to conclude that FERC's NOPR will lead to increased NO_x emissions due to increased exports into the eastern United States by midwestern utilities such as AEP.

Each of PHB's conclusions is discussed in detail below.

AEP'S CAPACITY TO GENERATE ADDITIONAL ELECTRICITY

Use of an Outdated Resource Plan

The Center used AEP's 1994 Acid Rain Plan² in its analysis. This plan included new coal units by the year 2011. However, in AEP's 1995 Integrated Resource Plan (IRP),³ only simple cycle and combined cycle gas units are expected to come on-line by 2011. The capacity additions under AEP's 1994 and 1995 plans are summarized in Table 1. AEP's current plan for new gas-fired generating plants instead of new coal-fired generating plants is consistent with an industry trend that is driven by a consensus that low future gas prices, combined with the lower capital cost and efficiency advantages of combined cycle units, will cause new gas-fired generating capacity to be less expensive than new coal-fired generating capacity.

² AEP Acid Rain Compliance Plan, Case No. 94-1181-EL-ECP, October 1994.

³ AEP Integrated Resource Plan, August 1995.

Table 1
Comparison of AEP Capacity Additions
(Megawatts)

	2000-2011	2009-2011
1994 Acid Rain Plan		
Combustion Turbine	2,805	—
Combined Cycle	—	—
Coal	—	3,640
1995 IRP		
Combustion Turbine	4,950	—
Combined Cycle	—	1,862
Coal	—	—

To calculate the maximum incremental coal-fired generation that could be available from AEP's system, PHB used AEP's 1995 IRP. PHB compared AEP's available coal-fired capacity to AEP's projected demand from its current contractual commitments (i.e., customer's located within AEP's service territory and existing long-term power sales contracts) to calculate the maximum incremental electricity that AEP would have available for export to other regions such as New York. As shown in Table 2, AEP is currently projected to have much less excess electricity by 2011 than assumed by the Center.

Another critical factor illustrated by the results in Table 2 is that most of the excess energy from AEP's system would be available during off-peak hours (i.e., at night and on weekends). The Center's estimates fail to distinguish between on-peak and off-peak energy. This is an important distinction. The market price for energy is higher on-peak than off-peak. On-peak, the load is higher, and units with higher incremental costs must be dispatched to meet load, for both the potential buyers and the potential sellers. By not making this important distinction, the Center is implicitly assuming that New York can import at noon energy generated by AEP at midnight.

Table 2
Maximum Potential AEP Excess Coal-Fired Energy
(GWh)

	1999	2005	2011
PHB Estimate of Energy Available On-Peak	12,300	8,600	2,000
PHB Estimate of Energy Available Off-Peak	<u>26,800</u>	<u>22,800</u>	<u>12,700</u>
PHB Estimate of Total Energy Available	<u>39,100</u>	<u>31,400</u>	<u>14,700</u>
Center's Estimate of Energy Available ⁴	<u>31,200</u>	<u>34,000</u>	<u>35,200</u>

AEP's NO_x Emissions Are Overstated

As a result of the Center's incorrect estimation of AEP's ability to generate additional energy, the Center overstates AEP's potential NO_x emissions. To illustrate the magnitude of the Center's overstatement of AEP's NO_x emissions, PHB reviewed a "Maximum AEP Import" scenario — in which all of the additional NYPP imports are assumed to come from AEP — which was developed by the New York State Department of Public Service.⁵ The New York State Department of Public Service reports *annual* NO_x emissions; the Center reports *ozone season* emissions. Using the Center's methodology, we adjusted the Department of Public Service's forecast downward (to 5/12 of the annual total) to estimate NO_x emissions on an ozone season basis. As shown in Table 3, New York State's estimates of incremental NO_x emissions are much less than the Center's estimates.

⁴ Center's Discussion Paper, Table 6 (p. A2-9).

⁵ Draft Generic Environmental Impact Statement in the Case 94-E-0952 - In the matter of Competitive Opportunities Regarding Electric Service, New York State Department of Public Service, March 1996.

Table 3
Incremental AEP Ozone Season NO_x Emissions Forecast
(Tons NO_x)

	1999	2000	2001	2002	2003	2005	2011
NYS "Maximum AEP Import" Case	6,012	5,698	7,547	8,405	10,083	—	—
Center 80% w/"Merchant Plants"	52,900	—	—	—	—	47,700	59,100
Center 20% w/"Merchant Plants"	15,000	—	—	—	—	18,600	34,600

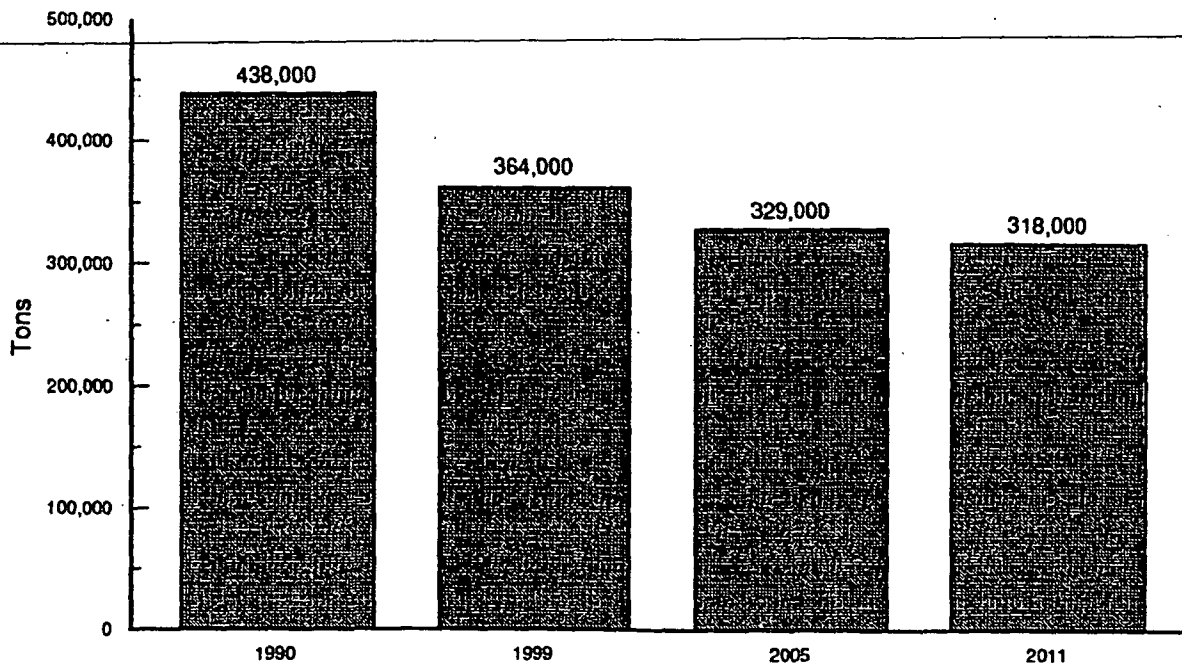
It is also important to mention that, as shown in Figure 1, PHB projects that AEP's total NO_x emissions associated with native load and firm sales will decline relative to 1990 levels by 1999, and decline still further by 2011. This projected reduction in NO_x emissions is due largely to the installation of combustion modification technologies to comply with the 1990 Clean Air Act Amendments.

Finally, it is important to note that other investigators, including FERC and the Interstate Natural Gas Association of America (INGAA),⁶ have found that the NOPR will not result in significant NO_x impacts. In fact, INGAA has found quite the opposite: NO_x emissions will decrease in the Northeast. INGAA believes that FERC's Open Access NOPR will speed the entry of gas combined cycle units, which have lower emission rates for NO_x, into eastern markets close to load centers.

⁶ Letter from Jerald Halvorsen, President of INGAA, to Carol Browner, Administrator of EPA, March 12, 1996.

Figure 1

AEP's Estimated NO_x Emissions Associated with Native Load and Firm Sales



ECONOMICS OF INCREASED AEP EXPORTS TO NEW YORK

The Center's economic argument is that low-cost energy from midwestern utilities such as AEP would flow to the NYPP, providing economic benefits to New York State utilities, AEP and their customers; however, the Center also argues that this low-cost energy would harm the environment because of increased midwestern NO_x emissions. Based on PHB's review of the Center's study, we believe that there are three principal limitations in the Center's analysis:

- The Center fails to properly include the cost of the transmission losses that occur when wheeling the electricity from the Midwest to the NYPP.
- The Center's "hypothetical spot market price" in NYPP is conceptually incorrect and the dynamics of the NYPP market are not taken into account.
- The Center's estimated cost of NO_x offsets is calculated incorrectly.

Each of these limitations is discussed below.

Cost of Losses

The Center fails to account for losses that would be incurred in wheeling energy from AEP to New York. Transmission level losses would be at least 8 percent. AEP's transmission level losses are 3.6 percent, and Allegheny Power System's losses are 2.2 percent. The Pennsylvania New Jersey Maryland Interconnection (PJM) is expected to report transmission level losses this spring, which are likely to be between 2 and 3 percent, resulting in overall losses from AEP to NYPP of 8 to 9 percent. In our corrections to the Center's analysis, we assume 8 percent.⁷

Overstated New York Power Pool Market Prices

The Center's use and estimate of an average NYPP market price is problematic for two broad reasons. First, it is not a conceptually correct measure to use for this type of analysis, and, second, even if it was conceptually correct, it appears to be incorrectly calculated. Each of these issues is discussed below.

Conceptual Issues

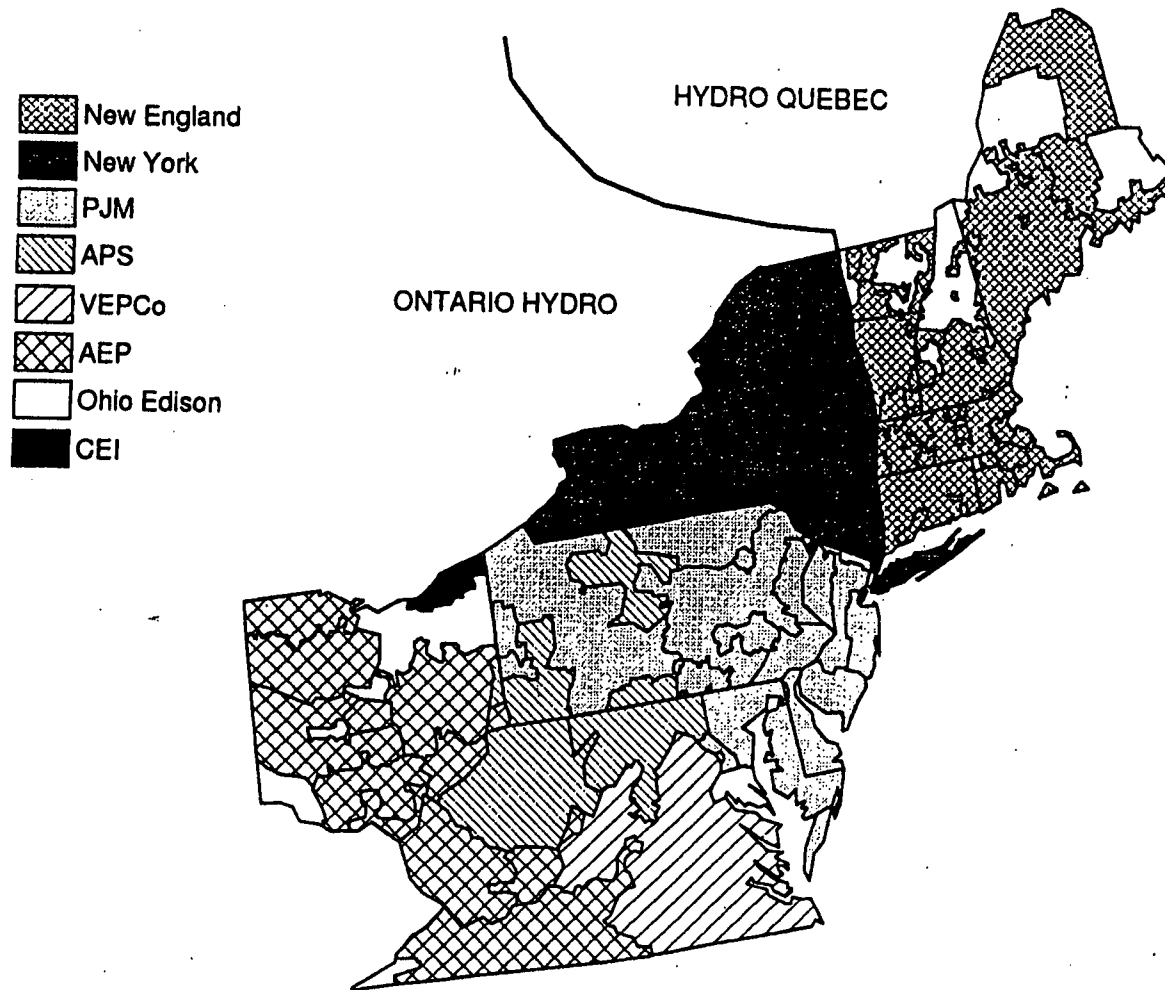
AEP's energy gets to the NYPP principally via PJM into upstate New York or across PJM into downstate New York. Along the way, there are many inexpensive resources in competition with AEP's resources. Figure 2 shows the NYPP and neighboring utility systems.

The value of energy in New York varies by time of day, by day of the week and by season of the year. During high load periods, the value of energy reflects the cost of gas-fired and even oil-fired generation. During low-load periods, the value of energy is much lower, where the incremental generation costs reflect coal-fired generation or even nuclear generation, since there is a large number of must-run Independent Power Plants (IPPs) in New York.

⁷

Most sales from AEP to NYPP would flow through the Allegheny Power System and PJM.

Figure 2
The New York Power Pool and Neighboring Power Systems



Further, the value of energy in New York varies geographically, reflecting transmission constraints. The value is higher in southeastern New York (downstate), often reflecting oil- and gas-fired generation. It is lower in northwestern New York (upstate), reflecting IPPs, nuclear, coal and low-cost imports from Canada. Southeastern New York imports power from northwestern New York, but transmission constraints often preclude an equilibration of the price/value of energy between the two regions.

The transmission interties are such that AEP would export energy to northwestern New York where the value of energy is lower. Transmission constraints would, normally, preclude the export of AEP energy to southeastern New York.

The Center uses a price of electricity characterized as "NYPP system average variable costs." This figure mixes on-peak and off-peak values. Further, it apparently averages southeastern values with northwestern values. AEP would not be able to sell at an average price, but would have to sell at the price for that period and at the lower price in northwestern New York. The higher price in southeastern New York is probably not relevant to AEP.

Similarly, the incremental costs of AEP generation vary by time of day, by day of the week, and by season of the year. This means that the value of energy is lowest in New York off-peak, when AEP's incremental costs are lowest and when AEP has the most available energy for sale. Also, the value of energy is highest in New York on-peak, when AEP's incremental costs are highest and when AEP has the least available for sale.

Table 4 compares on-peak and off-peak energy costs in 1994 for AEP and northwestern New York.⁸ In order for energy sales to be economic, the cost in New York minus the cost in AEP must exceed wheeling rates and transmission losses. However, even at low wheeling rates, the net margin is negative.

If somehow AEP could export all of its "surplus" electricity off-peak, its incremental costs would increase from off-peak levels to on-peak levels. Hence, such exports would become even less economic.

⁸ 1994 New York State Electric and Gas data filed in FERC Form 714 are used as a proxy for upstate New York. AEP system average data for 1994 are used for AEP.

Table 4
Relative Cost in 1994
(mills/kWh)

	Ozone Season ⁹	Other Months
New York		
On-peak	16.5	18.1
Off-peak	12.4	14.7
AEP		
On-peak	15.7	16.0
Off-peak	11.9	13.4
Wheeling Costs		
Rate	1.5 - 12.0	1.5 - 12.0
Losses		
On-peak	1.4	1.4
Off-peak	1.0	1.2
Net Margin¹⁰		
On-peak	(2.1) - (12.6)	(0.8) - (11.3)
Off-peak	(2.0) - (12.5)	(1.4) - (11.9)

The Center's Incorrect Estimate of an Average NYPP Market Price

The Center's estimate of the market price for electricity in the NYPP is based on an unspecified weighted average of "NYPP system average variable costs" and coal-fired energy cost in NYPP. As discussed above, this is not an appropriate method to determine the economics of increased electricity exports from the Midwest into the NYPP.

Another problem is that the Center appears to have overestimated the market price for electricity in the NYPP. Specifically, the Center's estimate of the average cost exceeds the *total* cost of new combined cycle units (including capital and O&M), and the Center's projection of NYPP baseload coal cost appears to be too high and is inconsistent with the Center's projected coal cost for AEP. In constant 1996 dollars, the Center's estimated system average variable cost increases from \$30.6/MWh in 1999 to \$43.6/MWh in 2005 and \$48.6/MWh in 2011. In view of the fact that the NYPP generation mix is over 50 percent nuclear, hydro and coal, the Center's "NYPP system average variable cost" is out of line with this mix. Even gas steam units would not cost \$43.6/MWh in 2005 or \$48.6/MWh in 2011 unless natural gas costs approximately twice as much as the Department of Energy forecasts.¹¹

⁹ The ozone season includes the months May through September.

¹⁰ Net margin is the price in New York minus the price in AEP minus wheeling costs.

¹¹ DOE's 1996 Annual Energy Outlook projects gas prices to electric utilities to be \$2.31 in 2005 and \$2.49 in 2010 (1994\$).

The Center's estimate of the NYPP baseload coal cost is also suspect. The forecast implies an overall cost of coal generation that rises by 6 percent in real terms between 1999 and 2011. On the other hand, the Center's forecasted cost of AEP's coal-fired generation (in its 80 percent case) declines in real terms by 14 percent between 1999 and 2011. Given that AEP and PHB believe that future coal prices will decline in real terms because of productivity gains, the Center's estimate of future coal costs in the NYPP appears to be overstated.

Corrected AEP Analysis

In this section, we will explore the economics of AEP generated energy competing in the NYPP in light of the discussion above. This section does not address the inability to physically transmit the AEP energy to New York.

As discussed above, use of an average market price for electricity in the NYPP is not the conceptually correct way to evaluate the economics of increased electricity exports from the Midwest to the NYPP. However, to illustrate how PHB's additional analysis supports conclusions that differ from the Center's, we have used the NYPP average coal cost as a proxy for the average competitive price in the NYPP. PHB believes that the Center's estimate of future NYPP coal costs are inconsistent with its (and PHB's) estimate of AEP's coal cost. However, it is conservative from the point of view of making the best case for AEP's market potential in the NYPP, and we use the Center's NYPP coal cost and PHB's estimate of AEP's coal cost (lower than the Center's) as market prices for this illustration.

Table 5 below presents the same basic information that is in the Center's report (see Tables 9 and 11), adjusted for income taxes and losses and more appropriate estimates of market prices for energy.

Table 5
Economics of AEP Sales to NYPP
(1996\$/MWh)

	1999	2005
Sales Price in NYPP	20.3	20.8
AEP Variable Cost	(16.5)	(15.0)
Wheeling Charges	(2.7)	(2.7)
Cost of Losses (@8%)	(1.4)	(1.3)
Pre-tax Income	(0.3)	1.8
Income Taxes (@41.7%)	0.1	(0.8)
After-tax Income	(0.2)	1.0
After-tax Profit Margin	(1.0%)	4.8%

It can be concluded from the results in Table 5 that, even with these very conservative assumptions, the economics of increased electricity sales from AEP to the NYPP are marginal at best. In fact, when the estimated costs for NO_x offsets are included, the average delivered cost of energy from AEP to New York would be greater in 2005 than the average price of energy in New York.¹²

Economics of "Merchant Plants"

To evaluate the Center's assumption that AEP's existing coal plants could be refurbished and operated as "merchant plants," PHB undertook an analysis to determine if it would be economical for AEP to refurbish plants and to operate these plants solely as "merchant plants" to sell power into the New York market.

Based upon data from the Electric Power Research Institute and the Energy Information Agency, PHB estimated the capital and operating costs (including the costs of SO₂ emission allowances) from continued operation of older coal-fired generating capacity in the Midwest. PHB then added the wheeling costs (and associated transmission losses) to deliver electricity from these coal plants to the NYPP. Finally, PHB compared the delivered cost of electricity from these midwestern plants to the Center's estimated NYPP coal-fired energy cost. The results are shown in Table 6.

¹² SNCR or SCR would be needed to achieve NO_x reductions significantly beyond the combustion modifications required to comply with the 1990 Clean Air Act Amendments. Under the best of conditions, this would cost about \$1,500/ton for the ozone season. Using these cost estimates, PHB has calculated the average cost of offsetting NO_x emissions as \$5.3/Mwh and \$4.4/MWh in 1999 and 2005, respectively, in 1996 dollars. Gas reburning, the most cost-effective gas-based technology, would cost two or three times as much as SCR or SNCR. Also, it appears that the Center did not inflate the costs of NO_x offsets to future year nominal dollars before computing the ratio of net income to sales (please see the Center's Tables 11 and 14).

Table 6
Cost of Electricity in 2005 in NYPP from Merchant Plants¹³
(1996 \$/MWh)

Variable Cost¹⁴	15.0
Fixed O&M	4.1
Capital Cost¹⁵	6.3
Wheeling Costs to NYPP	1.5 - 12.0
Cost of Losses (@8%)	1.3
Estimated Cost of Coal-fired Energy in NYPP	28.2 - 38.7
Center's Estimated NYPP Cost of Coal-Fired Energy¹⁶	21.5

It is clear from the results in Table 6 that operating these plants to sell in the New York market would result in significant economic losses. Therefore, there appears to be no economic rationale to the Center's claim that AEP's retired coal plants could be refurbished and economically operated as "merchant plants." This represents a serious flaw in the Center's analysis since in 2011, between 40 percent and 80 percent of the increased NO_x emissions in the Center's analysis would come from "merchant plants."¹⁷

TRANSMISSION CAPACITY

Current (and planned) transmission capacity into New York is 8,800 MW, but the maximum simultaneous import capability is about 6,500 MW at the summer peak. Much of this capacity is used to import low-cost hydro (and nuclear) power from Ontario Hydro and Hydro Quebec.

¹³ The concept "merchant plants" refers to electric generating plants that would be built (or refurbished) to sell electricity into the bulk power market. It is expected that only a fraction of the "merchant plants" output would be sold under long-term contracts. Rather, most of these plants' output would be sold on the spot market or under short-term contracts.

¹⁴ Variable costs include fuel, variable O&M, and SO₂ allowances.

¹⁵ Capital cost estimate is from "Life Optimization of Fossil Fuel Power Plants," Electric Power Research Institute, 1990, Report GS 7064.

¹⁶ This is the Center's "NYPP baseload coal cost" stated in 1996 dollars.

¹⁷ As a side note, the Breed plant, which was retired in 1994 and provides the bulk of the Center's "merchant plant" energy, is in the process of being dismantled.

The New York State Department of Public Service reports between 400 average MW¹⁸ and 1,100 average MW of additional power could be imported from AEP in an "import maximization" scenario. Moreover, as discussed above, the interface between northwest New York and southeastern New York is already loaded with power from must-run IPPs, Canada and other low-cost generation.¹⁹

As shown in Table 7, the Center's estimates reflect a much higher level of imports than assumed by the New York State Department of Public Service in their "import maximization scenario."

Table 7
Estimated AEP Imports into New York

	Average MW
New York State Department of Public Service	400 - 1,100
Center for Clean Air Policy	
"20% Case" with Merchant Plants	1,000 - 2,600
"80% Case" with Merchant Plants	3,600 - 5,500

New transmission capacity could be built, but this would have to overcome important hurdles. Often there is public opposition to new capacity.²⁰ Further, it would have to be economically justified. If the incremental cost differential between New York and AEP is not great enough for enough hours per year and enough years, then the capital costs of the new transmission line cannot be justified. See Table 8.

¹⁸ Average MW is 1 MW for all hours of the year, or 8760 MWh. It is a useful way to compare transmission limits expressed in MW and energy levels expressed in MWh.

¹⁹ The existence of transmission limitations is also supported by other studies. For example, in its March 29, 1986, study entitled, "Electricity Deregulation in the Northeast: Opportunities and Challenges in the Changing Industry," The Regional Affairs Leadership Center, Inc., concludes that "[f]rom a technical perspective, it is simply not a realistic view that cheap Midwestern power will flood the New England market (or the PJM for that matter). There are extreme limitations on the capacity of the transmission system to accommodate this transfer and even if transmission capacity were increased, it is not clear how much reserve there is in the Midwest to allow mega-transfers to New England (particularly during peak-demand periods)." Also, as Casazza Schultz notes in an appendix to the Center's Comments on the Draft environmental Impact Statement for the FERC's proposed NOPR, "... transmission from west to east across the NYPP, and across Pennsylvania to the east and south, has been close to its physical limits for some time." Also the study entitled, "1995 SUMMER ASSESSMENT: Reliability of Bulk Electricity Supply," North American Electricity Reliability Council, May 1995, supports the existence of transmission constraints.

²⁰ For example, recent proposals to expand transmission capacity have faced stiff opposition. Examples of such projects include the GPU-Duquesne 500-kV line in Pennsylvania, which has been canceled, and an AEP-Virginia Power 765-kV project to reinforce the interconnection between those two companies.

Table 8
Illustrative New Transmission Line Economics

Investment Life (Years)	5	5	20	20
Hours per year	3,000	6,000	3,000	6,000
Capital Cost of Line				
\$/kW	\$200-\$400	\$200-\$400	\$200-\$400	\$200-\$400
mills/kWh ²¹	25-51	13-25	9-17	4-9
Wheeling Costs (Mills/kWh)	2-12	2-12	2-12	2-12
Required Margin (Mills/kWh)	27-63	15-37	11-29	6-21

Since AEP's capacity to generate electricity will diminish over time, particularly on-peak, any new line would have to be justified over fewer hours and/or fewer years. Further, even at 6,000 hours per year for 20 years — which is much too long for AEP since excess energy will decline over the next 10 to 15 years — the margin between AEP and New York is unlikely to exceed 6 mills for more than a small percentage of hours in the year.

In addition to new transmission lines, technologies such as Flexible AC Transmission Systems may be able to add incrementally to transfer capability at, what is estimated to be, relatively low cost compared to the cost of building a new line. It is unlikely, however, that these technologies can add the level of import capability implied by the Center's forecast.

IMPLICATIONS OF ANALYSIS

Ultimately, the importance of the conclusions about changes in NO_x emissions from midwestern power plants either drawn by the Center or presented in this study should be determined by an analysis of the environmental effects of those emissions. The Center failed to address such effects except to assume that an increase in NO_x emissions must mean an increase in ground level ozone levels hundreds of miles away. Such a simplistic approach has little merit.

A scientifically-based quantitative analysis of the Northeast ozone non-attainment problem is needed to more accurately determine the emission source categories that may provide the most environmentally effective controls.

²¹

Using a real capital charge rate of 38 percent for a 5-year life and 13 percent for a 20-year life.

cc: Doug S.
Jim W.

UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY

Enron Power Marketing, Inc.

)

FE Docket No. EA-102A

)

El Paso Electric Company

)

FE Docket No. EA-48-I

COMMENTS OF THE DETROIT EDISON COMPANY
ON THE EMERGENCY APPLICATION OF
ENRON POWER MARKETING, INC.,
FOR SUPPLEMENTAL ORDERS AUTHORIZING
ELECTRICITY EXPORT TO MEXICO

On October 7, 1996, Enron Power Marketing, Inc. ("Enron"), filed an Emergency Application for Supplemental Orders Authorizing Electricity Export to Mexico (the "Application"). The Application requests the Department of Energy ("DOE" or the "Department") to supplement its orders in the above-referenced dockets authorizing Enron and El Paso Electric Company ("El Paso") to export electricity to Mexico to require El Paso to provide Enron with non-discriminatory transmission access over El Paso's transmission system to Mexico. The Application also requests the Department to amend El Paso's Presidential Permits to the extent necessary to grant Enron's request. The Detroit Edison Company ("Detroit Edison") respectfully submits its comments on the Application to the extent the Department's determination may result in the issuance of a general policy applicable to other international transmission facilities and transborder transactions subject to DOE jurisdiction.

DESCRIPTION AND INTEREST OF DETROIT EDISON

Detroit Edison is a public utility company organized under the laws of the State of Michigan. It owns and operates an integrated electrical generation, transmission, and distribution system for the provision of services to more than two million customers in Michigan. Detroit Edison's transmission system is directly interconnected over the United States/Canada border with the transmission system of Ontario Hydro. Detroit Edison holds Presidential Permits ("PPs") for four transborder transmission interconnections with Ontario Hydro: two 345 kV interconnections at St. Clair, Michigan (PP-38 and PP-58) and two 230 kV interconnections at Marysville, Michigan (PP-21) and at Detroit, Michigan (PP-21). As an owner of a transmission system interconnected over an international border with a foreign utility, Detroit Edison may be affected by DOE's resolution of the Application, particularly if such resolution is applied generally to transborder facilities subject to DOE jurisdiction.

Detroit Edison supports FERC's Order No. 888¹ approach to the development of competitive electric markets through the establishment of non-discriminatory open access transmission. Detroit Edison is concerned, however, that the Department's grant of the relief sought in this Application may actually distort and impede the development of fair and competitive electric markets unless the Department makes it clear that any permits and licenses it grants are conditioned on compliance with all aspects of Order No. 888, including its reciprocal access provisions. Detroit Edison therefore urges the Department to condition any approval of Enron's Application in the instant proceeding, and

1. Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, FERC Stats. & Regs. ¶ 31,036 (1996) (Order No. 888).

all similar applications, on full compliance with all provisions of Order No. 888 by transmission customers and other parties to transborder transactions.

DISCUSSION

As an initial matter, the Application requests DOE to require El Paso to provide Enron with non-discriminatory transmission service over El Paso's transmission system to Mexico. DOE, however, does not have the authority to *order* El Paso to provide such service.² Instead, DOE has the authority only to condition its grant of export authority as it may find necessary and appropriate,³ which may including providing transmission service in a non-discriminatory manner such as that required by Order No. 888.

2. Section 212(h) of the Federal Power Act, 16 U.S.C. § 824k(h). FPA § 212(h) provides that "[n]o order issued under this Act shall be conditioned upon or require the transmission of electric energy: (1) directly to an ultimate consumer, or (2) to, or for the benefit of, an entity if such electric energy would be sold by such entity directly to an ultimate consumer, unless (A) such entity is a Federal power marketing agency; the Tennessee Valley Authority; a State or any political subdivision of a State (or an agency, authority, or instrumentality of a State or a political subdivision); a corporation or association . . . ; a person having an obligation arising under State or local law . . . ; or any corporation or association which is wholly owned, directly or indirectly, by any one of the foregoing; and" Enron seeks to transmit electricity to Comisión Federal Electricidad ("CFE"), the government-owned national electric utility of Mexico. Because the electricity Enron seeks to transmit to CFE will be sold by CFE to ultimate consumers in Mexico and none of the exceptions enumerated in the statute are applicable, DOE is prohibited by § 212(h) from ordering El Paso to provide the requested service.

3. Section 202(e) of the FPA, 16 U.S.C. § 824a(e). FPA § 202(e) provides that "no person shall transmit any electric energy from the United States to a foreign country without first having secured an order of the Commission *authorizing* it to do so. . . The Commission may by its order grant such application in whole or in part, with such modifications and upon such terms and conditions as the Commission may find necessary and appropriate." (emphasis added). Although the statute recites that determinations on applications for export authority are made by the Commission, the Department of Energy Organization Act transferred such determinations to DOE. 42 U.S.C. § 7172(f).

Detroit Edison fully supports the Federal Energy Regulatory Commission's ("Commission") goal of encouraging fair competition through non-discriminatory open access to transmission systems and considers Order No. 888 to be a powerful vehicle for achieving that goal. Fair open access will be achieved, however, only if all of the provisions of Order No. 888 are consistently applied in all transactions in both interstate and foreign commerce. Inconsistent application of Order No. 888 would produce a significantly tilted competitive playing field and would hamper the development of open and competitive markets.⁴

**The Department Should Support FERC's Open Access Goals By Conditioning
All Transborder Transmission Transactions Upon Full Compliance by
All Parties to the Transaction With the Reciprocal Access Provisions of Order No. 888**

In Order No. 888, the Commission expressly endorsed the concept of reciprocal transmission access in foreign commerce by concluding that "[t]o the extent that [a foreign entity] obtains access [under an open access tariff,] we emphasize that it would be subject to all of the terms and conditions of the applicable open access tariff, including the requirement that it provide reciprocal service." 61 Fed.Reg. 21,571 (italics in original, emphasis added). The Commission recognized that permitting foreign entities to take service under an open access tariff "should result in increased competition and lead to customers paying the lowest possible prices for their electric energy needs." *Id.* The Commission also implicitly recognized, however, that it would be unfair and disruptive to markets

4. Although the discussion that follows focuses on the reciprocal access provisions of Order No. 888, DOE should recognize more generally that Order No. 888 seeks to transition the electric industry to a "competitive, open access environment" by implementing a unified set of requirements in furtherance of the principles of open access, non-discrimination, and stranded cost recovery. To the extent DOE, as a matter of policy, conditions export licenses and Presidential Permits on compliance with Order No. 888's requirements, it should take care to do so uniformly with regard to all provisions of the Order. DOE should respect the structure and purpose of Order No. 888 by conditioning any grant of export authority on compliance with all of Order No. 888's provisions.

to permit foreign entities to take service under an open access tariff without requiring the foreign entity to provide reciprocal service, and so the Commission expressly requires the provision of reciprocal service by foreign entities.

~~DOE should likewise condition any approval of this Application and similar applications upon~~
the requirement that all transmission customers and other parties to a transborder transaction provide reciprocal transmission service. To permit otherwise would unfairly allow foreign entities to reap the benefits of service on the system of a domestic utility without requiring the foreign entity to provide reciprocal access and benefits to the domestic utility and its ratepayers. Conditioning its export authority upon an agreement by the foreign entity to provide reciprocal transmission service will help DOE to maintain the integrity of the Order No. 888 open access regime and affirm the principles upon which Order No. 888 is built.

DOE has a responsibility to ensure fair competition and a level competitive playing field by requiring reciprocal access as a condition of any transmission authorization across an international boundary.⁵ Detroit Edison strongly urges DOE to so condition any approval of the instant Application and similar applications.

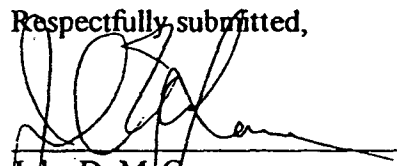
5. Conditioning any grant of export authority upon compliance with Order No. 888's reciprocal access requirement is fully consistent with the principles of the North American Free Trade Agreement ("NAFTA"). NAFTA requires that foreign entities be entitled to the same trade rights and privileges as domestic entities. In the context of electric transmission service, all domestic entities must provide reciprocal service in order to qualify for transmission access under Order No. 888. DOE should apply these same eligibility requirement to foreign entities.

CONCLUSION

The Department's resolution of issues raised in this proceeding may have precedential effect for other transborder transactions involving electric transmission, including transactions involving ~~Detroit Edison's international interconnections. Detroit Edison therefore requests that the~~ Department affirm the principles of open access, comparability, and stranded cost recovery that apply to all domestic transactions by applying Order No. 888's principles to all parties, domestic and foreign, to all transborder transactions.

Detroit Edison supports the development of competitive electric markets and considers the framework erected by Order No. 888 to be a sound structure within which such markets will evolve. In order for those markets to develop, however, Order No. 888's provisions must be implemented in a consistent manner and applied equally to all market participants, domestic and foreign.

Respectfully submitted,



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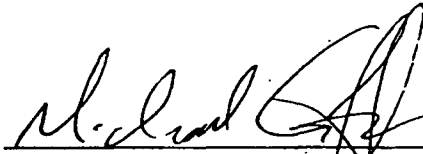
Attorneys for The Detroit Edison Company

Date: October 25, 1996

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Department of Energy in this proceeding.

Dated at Washington, D.C., this 25th day of October, 1996.



Michael C. Griffen
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1800 M Street, N.W.
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Tel: (202) 467-7257
Fax: (202) 467-7176

IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE

WEST TEXAS MARKETING
CORPORATION

DEBTOR,

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§

CASE NO. 182-00034-7

ORDER APPROVING TRUSTEE'S FINAL REPORT

Came on for consideration Trustee's Final Report in the captioned case. The Court finds that appropriate notice under the circumstances was given, that no objections have been filed, and that the Office of the U.S. Trustee has approved the Trustee's Final Report as submitted. Accordingly, it is hereby

ORDERED that the Trustee's Final Report is accepted and approved in all respects, and the Trustee is authorized to make payments and otherwise proceed to implement the Trustee's Final Report so that this case may be closed without undue delay.

Dated September 30, 1996.

ORIGINAL SIGNED BY
/s/ JOHN C. AKARD

Honorable John C. Akard
UNITED STATES BANKRUPTCY JUDGE

IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE

WEST TEXAS MARKETING
CORPORATION

DEBTOR,

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CASE NO. 182-00034-7

**ORDER GRANTING TRUSTEE'S
FINAL APPLICATION FOR COMPENSATION**

CAME ON FOR CONSIDERATION the Final Application For Compensation (the "Application") filed by Walter C. Kellogg, Trustee in the above-captioned bankruptcy case (the "Trustee"). The Court finds that appropriate notice under the circumstances was given, and that no objections have been filed or served upon counsel for the Trustee other than the objection filed by the Office of the U.S. Trustee, which objection is overruled. Accordingly, it is

ORDERED that the Trustee is hereby allowed compensation of \$4,159.68 for services rendered by the Trustee during the period of January 1, 1995 through May 31, 1996; it is further

ORDERED that the compensation of \$273,131.70, previously allowed the Trustee herein on an interim basis, is hereby fully and finally allowed; it is further

ORDERED that the Trustee is hereby awarded a bonus of \$277,291.39, representing another one percent (1%) of total disbursements made herein; it is further

IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE

WEST TEXAS MARKETING
CORPORATION

DEBTOR,

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CASE NO. 182-00034-7

ORDER ON FINAL APPLICATION OF GARDERE & WYNNE, L.L.P.,
ATTORNEYS FOR TRUSTEE, FOR COMPENSATION AND EXPENSES

The Court has considered the Final Application of Gardere & Wynne, L.L.P., Attorneys for Trustee, for Compensation and Expenses filed herein. The Court finds that appropriate notice under the circumstances was given, that no objections have been filed or served upon counsel for the Trustee, and that the Office of the U.S. Trustee has not objected to the allowance of interim compensation as requested. Accordingly, it is

ORDERED, that Gardere & Wynne is hereby allowed compensation of \$22,255.70 and expenses of \$2,486.74, for services rendered as attorneys for the Trustee during the period of February 10, 1995 through July 23, 1996; it is further

ORDERED, that compensation of \$579,573.00 and expenses of \$44,505.23, previously allowed Gardere & Wynne herein on an interim basis, are hereby fully and finally allowed; and it is finally

IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE:	§	
	§	
WEST TEXAS MARKETING	§	CASE NO. 182-00034-7
CORPORATION	§	
	§	
DEBTOR	§	

ORDER ALLOWING FEES AND EXPENSES
OF LAIN, FAULKNER & CO., P.C.
AS ACCOUNTANTS FOR TRUSTEE

CAME ON for consideration the **Fifth and Final Application For Payment of Fees and Reimbursement of Out-of-Pocket Expenses**, filed by Lain, Faulkner & Co., P.C. ("Lain Faulkner") as accountants for the Trustee here. This Court finds that appropriate notice under the circumstances was given, that no objections have been filed, and that the Office of the U.S. Trustee has not objected to the allowance of the compensation as requested. Accordingly, it is

ORDERED, that Lain Faulkner, as accountants for the Trustee, is hereby allowed its requested fees of \$58,194.50 and its requested expenses of \$763.14, for the period of January 1, 1995 through May 31, 1996; it is further

ORDERED, that compensation of \$617,910.00 and expenses of \$8,223.35, previously allowed Lain Faulkner herein on an interim basis, are hereby fully and finally allowed; and it is finally

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IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE:	§	
	§	
WEST TEXAS MARKETING	§	CASE NO. 182-00034-7
CORPORATION	§	
	§	
DEBTOR	§	

**ORDER AUTHORIZING EMPLOYMENT OF YARMCHUK & ASSOCIATES, INC.
NUNC PRO TUNC AND ALLOWING FEES AND EXPENSES OF SAME**

The Court has considered the Application Pursuant to 11 U.S.C. §327(a) For Authority to Employ Yarmchuk & Associates, Inc. Nunc Pro Tunc and/or, For Allowance of Fees and Expenses of Yarmchuk & Associates, Inc. Pursuant to 11 U.S.C. §503 filed by Walter Kellogg, the court-appointed Trustee herein (the "Trustee"). The Court finds that appropriate notice under the circumstances was given and that no objections have been filed or served upon counsel for the Trustee, other than the objection filed by the Office of the U.S. Trustee, which objection the Court overrules. Accordingly, it is

ORDERED, that Yarmchuk & Associates, Inc. ("Yarmchuk") is hereby employed, nunc pro tunc to October 18, 1982, as accountants for the Trustee; and it is further

ORDERED, that the sum of \$10,525.00 is hereby allowed Yarmchuk as compensation for the period commencing October 18, 1982 and ending June 30, 1986.

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IN THE UNITED STATES BANKRUPTCY COURT
FOR THE NORTHERN DISTRICT OF TEXAS
ABILENE DIVISION

IN RE:

WEST TEXAS MARKETING
CORPORATION

DEBTOR

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CASE NO. 182-00034-7

**ORDER AUTHORIZING EMPLOYMENT OF ANN ROSS NUNC PRO TUNC
AND ALLOWING FEES AND EXPENSES OF SAME**

The Court has considered the Application Pursuant to 11 U.S.C. §327(a) For Authority to Employ Ann Ross, Nunc Pro Tunc and/or, For Allowance of Fees and Expenses of Ann Ross Pursuant to 11 U.S.C. §503 filed by Walter Kellogg, the court-appointed Trustee herein (the "Trustee"). The Court finds that appropriate notice under the circumstances was given, that no objections have been filed or served upon counsel for the Trustee, and that the Office of the U.S. Trustee has not objected to the requested employment of Ann Ross, nunc pro tunc to October 18, 1982, as management assistant for the Trustee herein, or to the allowance of compensation as requested. Accordingly, it is

ORDERED, that Ann Ross is hereby employed, nunc pro tunc to October 18, 1982, as management assistant to the Trustee; and it is further

ORDERED, that the sum of \$46,600.00, and the sum of \$2,964.06, are hereby allowed Ms. Ross as compensation, and as reimbursement for out-of-pocket expenses, respectively, for the period commencing October 18, 1982 and ending June 30, 1986.

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UNITED STATES DEPARTMENT OF ENERGY

**Office of Fossil Energy
Washington, D.C.**

FE Docket No. EA-102

ENRON Power Marketing, Inc.

Electricity Export Authorization

Order Authorizing Electricity Export to Mexico

Order No. EA-102

February 6, 1996

ENRON POWER MARKETING, INC.

ORDER NO. EA-102

I. BACKGROUND

Exports of electric energy from the United States to a foreign country are regulated and require prior authorization under Section 202(e) of the Federal Power Act (FPA) (16 U.S.C. §824a(e)).

On October 4, 1994, ENRON Power Marketing, Inc. (ENRON) applied to the Office of Fossil Energy (FE) of the Department of Energy (DOE) for authorization to transmit electric energy to Mexico. ENRON is a power marketer which buys and sells electric energy for its own account and it has been authorized by the Federal Energy Regulatory Commission (FERC) to make sales of electric power at wholesale in interstate commerce, at negotiated rates. ENRON does not own or control any electric generating or transmission facilities, nor does it have a franchised service area.

ENRON proposes to purchase surplus electric energy from electric utilities and Federal power marketing agencies and to export this energy on its own behalf to Mexico. The energy to be exported would be delivered to Mexico over the international electric transmission facilities owned and operated by the San Diego Gas & Electric Company (SDG&E), the El Paso Electric Company (EPE), the Central Power & Light Company (CPL), and the Comision Federal de Electricidad (CFE, the national electric utility of Mexico).

Notice of this application appeared in the Federal Register on November 2, 1994, (59 FR 54399) requesting that comments, protests, and petitions to intervene be submitted to the DOE by January 3, 1995. During the initial comment period, DOE received petitions to intervene from SDG&E, EPE, and Citizens Utilities Company (Citizens), and a comment from the North American Electric Reliability Council (NERC). At the request of two of the respondents, on January 9, 1995, DOE extended the comment period to February 3, 1995, for those who responded to the initial Notice, and, at the same time, granted ENRON until February 21, 1995, to respond to all comments, protests, and petitions to intervene filed in this proceeding. During the extended comment period, DOE received a comment from the Edison Electric Institute (EEI), which had not responded during the initial comment period. In addition, DOE received a comment from the Electric Reliability Council of Texas (ERCOT) on March 2, 1995, and from a private citizen, Mr. Buck Scott, on May 19, 1995. As no protests were filed in opposition to out of time comments, DOE has included them in the Docket and given them appropriate consideration in rendering this final decision.

II. SUMMARY OF COMMENTS

A. PETITIONS TO INTERVENE AND PROTESTS

1. El Paso Electric Company

On January 3, 1995, EPE filed a petition to intervene and protest in this proceeding. EPE claims that it has an interest in this proceeding because ENRON is proposing to use the EPE international transmission facilities to deliver exported energy to Mexico. EPE also protests that the ENRON application is deficient in that it lacks much of the information required by the DOE regulations governing electricity exports. On this basis EPE requests that the ENRON application be dismissed without prejudice.

In its discussion, EPE expresses concerns that the export of electric energy as proposed by ENRON could cause numerous reliability problems on both the EPE system and other third party systems. EPE develops the point that the ENRON application does not contain sufficient information to allow DOE or other potentially impacted third party transmission owners to assess the reliability impacts of the ENRON proposal. EPE claims that neither DOE nor the FERC has the authority to compel third party transmission access for export transactions. Also, EPE points out that it presently is in bankruptcy and that the use of EPE's international transmission facilities by ENRON may require approval of the Bankruptcy Court. Finally, EPE argues that, because ENRON is not a "transmitter", ENRON does not have standing to apply for an electricity export authorization under section 202(e) of the FPA.

On February 3, 1995, EPE filed supplemental comments in this proceeding. In this subsequent filing, EPE discusses the distinction between the somewhat broad public interest standard for authorizing imports of natural gas under the Natural Gas Act and the FPA's more specific statutory criteria governing electricity exports. EPE also points out that the present DOE program for granting blanket authorizations to import natural gas was implemented only after developing and publishing policy guidelines which addressed the public interest aspects of natural gas imports on a generic basis. EPE notes that DOE has conducted no similar generic studies for electricity exports and, therefore, a decision on exports could be based only on the information in each export proceeding. EPE argues that, since ENRON has failed to provide the specific information upon which DOE could make determination on the reliability impacts of its proposal, no evaluation of the effects of exports by ENRON is possible.

2. San Diego Gas & Electric

On January 3, 1995, SDG&E filed a petition to intervene and comment in this proceeding. Because ENRON is proposing to use three of the SDG&E international transmission lines to export to Mexico, SDG&E claims an interest in this proceeding. In its comments, SDG&E notes that ENRON fails to address the potential reliability impacts of its proposal and that its

application lacks sufficient information for either DOE or third party transmitters to assess the impact of the ENRON proposal on their systems. SDG&E also is concerned that the ENRON proposal could adversely impact the reliability of the SDG&E system by impeding SDG&E from meeting its obligations to CFE under the terms of an interconnection and exchange agreement and by causing certain control area problems during unexpected termination of an ENRON export to CFE. Finally, SDG&E claims that providing ENRON with transmission wheeling service under certain circumstances could adversely impact SDG&E's favorable tax status with respect to its outstanding Industrial Development Bonds.

3. Citizens Utilities

On January 3, 1995, Citizens filed a petition to intervene and protest in this proceeding. Citizens claims a right to intervene in this proceeding since it owns international transmission facilities, exports electric energy to Canada and Mexico, and is a competitor of ENRON for electric sales outside the United States. In its protest, Citizens claims that the DOE proposal¹ for accepting alternative information as a proxy for the information required by DOE regulations would cause DOE to repudiate its responsibilities under the FPA to explicitly address electric reliability and would give electricity marketers a competitive advantage over electric utilities in international electricity trade. Based on the points raised in protest, Citizens also requests that the ENRON application be rejected.

B. WRITTEN COMMENTS

Comments were received from EEL, NERC, ERCOT, and Mr. Buck Scott. Both NERC and ERCOT expressed the belief that electricity marketers should be required to abide by all established operating guidelines of NERC and the relevant reliability councils. In particular this would include the "Agreements in Principle on Scheduled Interchange" which establishes the obligations of control areas in scheduling interchange, as well as the obligations of purchasing-selling entities not performing control area functions but wishing to schedule interchange. EEL commented that the ENRON application should be denied because it did not contain the required information with which to assess the electric reliability impacts of its proposal. Mr. Buck Scott was supportive of the ENRON proposal in that it promoted cooperation among the U.S., Canada, and Mexico.

C. RESPONSE OF ENRON

On February 21, 1995, ENRON filed "Response to Comments" in this proceeding. In its submission, ENRON did not oppose the petitions to intervene filed by EPE, SDG&E, and Citizens. ENRON claims that the energy proposed for export is, by definition, surplus to the

¹ This proposal was contained in the Federal Register notice of November 2, 1994 (59 FR 54899), announcing receipt of ENRON's application for an electricity export authorization.

needs of U.S. consumers. Also, ENRON contends that section 202(e) of the FPA contains a presumption in favor of granting an export authorization.

In response to the technical reliability issues raised, ENRON claims that it intends to abide by established industry standards for transmitting electric energy and that it would address all system constraint issues and seek to avoid any negative reliability impacts or other operating problems unique to any system through the various agreements it may reach with transmitting systems.

ENRON further claims that its request for waiver of certain information requirements contained in the DOE regulations is warranted based on the changed circumstances surrounding the electric power industry since the DOE regulations were promulgated in 1980.

III. ANALYSIS

The issue of FERC jurisdiction and authority to order retail wheeling is not relevant or a part of this DOE proceeding. Also, the issue of DOE's authority to order transmission service is not relevant, because that is not being done in this order.

The authority requested of DOE by ENRON under section 202(e) of the FPA is a necessary condition for exporting. However, even with this grant of authority, ENRON must still make the necessary commercial arrangements and obtain any and all other regulatory approvals which may be required in order to effect the export, including obtaining all necessary transmission access required to wheel the exported energy to the foreign purchaser.

In granting ENRON authority to export, DOE is broadening the approach it always has taken. Most of the more traditional exporters have been electric utilities or power pools whose members consist primarily of electric utilities. DOE always has predicated its reliability analyses for these entities on the assumption that the exported energy would be supplied from system power, i.e., provided from the exporting system's total supply resources, without associating the exported energy with any particular component of those resources. In fact, the total supply resources of either an individual utility or a power pool usually includes power purchased from other systems or regions. DOE believes it is neither possible nor appropriate to look behind an export and consider the reliability impacts of delivering power purchased from other sources onto the exporter's system.

Electricity marketers put together a power portfolio by purchasing various power products from a host of power suppliers. Because a marketer does not own any physical system to which these products may be delivered, DOE does not have the same starting point for its reliability analysis that it would in the case of the more traditional exporter. However, all exports by marketers do have identifiable delivery points: the transmission systems contiguous with the border. Once the exported energy arrives at one of these border systems, the impact on reliability

would be similar to that for exports which are supplied from the system power of that border system.

DOE already has granted export authorizations to all of the transmission systems contiguous with the U.S.-Mexican border. These authorizations contain limitations on the amount of power which could be exported over an international transmission line or grouping of lines. These export limits are based upon the reliability analyses performed in each of the export proceedings conducted by DOE.² This Order utilizes the results of those reliability analyses and requires ENRON to abide by the export limits contained in the export authorizations associated with the international transmission line(s) over which it proposes to export.

Commenters raised the issue that the ENRON application does not provide all of the information required by DOE's regulations and that this deficiency precludes a proper assessment of the reliability impacts of the export as required by the statutory requirements of the FPA.

DOE never has applied the information filing requirements contained in its regulations in a rigid manner. Each application for authorization to export has unique commercial and/or technical issues which make rigid filing requirements impractical. Also, the electric power industry is different today than it was when the regulations first were drafted at the onset of DOE, especially with the recent introduction of power marketers into the electricity industry. Consequently, DOE has always used a flexible approach in its review of the information necessary to evaluate the reliability impacts of a proposed export. Several recent export proceedings³ are examples where, in the absence of the more traditional technical information, DOE was satisfied that the export would not impair reliability. In each of these proceedings, DOE relied upon established industry guidelines, operating procedures and/or infrastructure as evidence that sufficient safeguards existed to maintain electric system reliability. DOE believes that the same situation exists in the case of ENRON's export application.

Furthermore, the U.S. electric power industry is vastly different today than it was in 1935. Integrated regional powerpools and multi-regional power exchanges were not envisioned at the time section 202(e) of the FPA was enacted. Similarly, the emergence of electricity marketers and brokers could not have been anticipated when the electricity export regulations were promulgated in 1980. Also the passage of the Energy Policy Act of 1992 and the signing of the North

² DOE has granted electricity export authorizations to SDG&E in Orders PP-68EA and PP-79EA, to EPE in Order EA-48-I, and to CPL in Order EA-94-A.

³ In each of the following Orders, DOE has authorized exports of electric energy to British Columbia Hydro, through the facilities of the Bonneville Power Administration (Presidential Permits PP-10, 36, and 46), without the benefit of empirical technical studies, but based on the infrastructure and existing agreements among potentially effected systems: Order EA-97, issued April 29, 1994, to Portland General Electric; Order EA-98, issued September 2, 1994, to 22 members of the Western Systems Power Pool; Order EA-100, issued April 19, 1994, to San Diego Gas & Electric; Order EA-101-A, issued October 23, 1995, to Washington Water Power.

American Free Trade Agreement in 1993 were both intended to promote increased competition in energy markets in general, and the electric power market in particular. The interpretation and implementation of the statutory and regulatory requirements governing exports of electricity, including the apparent favorable statutory presumption, should be consistent and account for these changes in the evolving electricity marketplace.

Present industry operating practices dictate that in order for electricity to be exported or, for that matter, moved anywhere in the U.S., two actions must be taken. First, the transaction must be scheduled with the appropriate control areas. Second, the exporter must obtain sufficient transmission access to wheel the electricity from the generating source to the border. The first requirement is almost a fait accompli. Since ENRON does not own or operate any generating or transmission facilities, it does not have the ability to move electric energy without the cooperation of the systems which do. With few exceptions, the generating sources from which ENRON would be purchasing electric energy are members of control areas and would have to schedule transactions with their respective control areas on behalf of ENRON. In deference to this point, the ordering language requires ENRON to abide by "...all reliability criteria, standards, and guides of the North American Electric Reliability Council and Regional Councils..." This includes NERC's recently approved "Agreements in Principle on Scheduled Interchange," which specify the requirements of control areas in scheduling interchange. The Agreements also establish the responsibilities of purchasing and selling entities, like ENRON, that do not perform control area functions, but wish to schedule interchange.

In order to obtain sufficient transmission access to wheel the electricity to the border, ENRON must come to terms with the affected transmission systems and obtain any necessary regulatory approvals. In considering ENRON's request, the transmission systems would have to assess the reliability impacts of moving the export through their systems and, presumably, would only agree to provide service under terms and conditions that would not cause reliability problems on their own systems.

IV. FINDING

Because ENRON has no native load obligations usually associated with a franchised service area, and because the electric power purchased by ENRON for export to Mexico would be surplus to the needs of those entities selling the power to ENRON, DOE finds that such exports by ENRON would not impair the sufficiency of electric supply within the United States. Furthermore, based on the above discussion and analysis, DOE finds that the proposed export would not impede or tend to impede the coordinated use of transmission facilities within the meaning of section 202(e) of the Federal Power Act.

The DOE also has assessed the potential environmental impacts associated with the authorizing of the proposed exports and has determined that this action is among those classes of actions not normally requiring preparation of an environmental assessment or an environmental impact statement, and, therefore, is eligible for categorical exclusion under Appendix B to

Subpart D, paragraph B4.2 of the revised DOE Regulations implementing the National Environmental Policy Act of 1969. Documentation of the use of this categorical exclusion has been placed in this Docket.

V. ORDER

Based on the above finding, it is hereby ordered that ENRON Power Marketing, Inc. (ENRON) is authorized to export electric energy to Mexico under the following terms and conditions:

(A) The electric energy exported by ENRON pursuant to this Order may be delivered to Mexico only over the following existing international transmission facilities⁴ for which assessments of the transmission limits for operation in the export mode have been made:

<u>Owner</u>	<u>Location</u>	<u>Voltage</u>	<u>Presidential Permit No.</u>	<u>Export Auth. Order No.</u>
SDG&E	Miguel, CA	230 kV	PP-68	PP-68EA
SDG&E	Imperial Valley, CA	230 kV	PP-79	PP-79EA
EPE	Diablo, NM	115 kV	PP-92	EA-48-I
EPE	Ascarate, TX	115 kV	PP-48	EA-48-I
CPL	Brownsville, TX	138 kV 69 kV	PP-94	EA-94-A
CFE	Eagle Pass, TX	138 kV	PP-50	EA-94-A
CFE	Laredo, TX	138 kV	PP-57	EA-94-A
	Falcon Dam, TX	138 kV	None	EA-94-A

(B) Exports authorized herein shall not cause a violation of the terms and conditions contained in existing electricity export authorizations associated with the international transmission facilities identified in paragraph A above. Specifically:

(1) Exports made by ENRON pursuant to this Order shall not cause the total exports on a combination of the facilities authorized by Presidential Permits PP-68 and PP-79 to exceed an instantaneous transmission rate of 400 megawatts (MW) pursuant to the export limits contained in Orders PP-68EA and PP-79EA.

⁴ In its application, ENRON included SDG&E's 69-kV line in the San Ysidro area as a possible export point. Since the time of the ENRON application, SDG&E applied to DOE to terminate that international border crossing which was granted on February 1, 1996, by Order No. PP-49-1. Consequently, this Order does not include the San Ysidro 69-kV line as an allowable export point.

(2) Exports made by ENRON pursuant to this Order shall not cause the total exports on a combination of the facilities authorized by Presidential Permits PP-48 and PP-92 to exceed an instantaneous transmission rate of 200 MW pursuant to export limits contained in Order EA-48-I.

(3) Exports made by ENRON pursuant to this Order shall not cause a violation of the export limits contained in Order EA-94-A. ~~Specifically, exports by ENRON shall not~~ cause the total exports on a combination of the 138 kV facilities at the Falcon Dam and the facilities authorized by Presidential Permits PP-50, PP-57, and PP-94 to exceed an instantaneous transmission rate of 600 MW during those times when the Central Power and Light (CPL) system is at a minimum load condition. During all other load conditions on the CPL system, exports by ENRON over the facilities identified in this subparagraph shall not cause the maximum rate of transmission to exceed:

(a) 300 MW for the 138 kV and 69 kV facilities authorized by Presidential Permit PP-94; or,

(b) 50 MW total for the 138 kV facilities at Falcon Dam and those authorized by Presidential Permits PP-50 and PP-57.

(C) Any change to the export limits contained in Orders PP-68EA, PP-79EA, EA-48-I, and EA-94-A resulting from an amendment of these Orders by DOE shall result in a concomitant change to the export limits contained in subparagraphs B(1), B(2), and B(3).

(D) ENRON may commence exports only over those international transmission lines identified in subparagraphs B(1), B(2), or B(3) for which ENRON provides DOE written evidence that sufficient transmission service has been obtained for delivery of the exported energy to the border.

(E) In scheduling the delivery of electricity exports to Mexico, ENRON shall comply with all reliability criteria, standards, and guides of the North American Electric Reliability Council and Regional Councils, on such terms as expressed therein, and as such criteria, standards, and guides may be amended from time to time.

(F) ENRON shall conduct all operations pursuant to the authorization hereby granted in accordance with the provisions of the Federal Power Act and pertinent rules, regulations, and orders adopted or issued by the DOE.

(G) The authorization herein granted may be modified from time to time or terminated by further order of the DOE, but in no event shall such authorization extend beyond the date of termination or expiration of the Presidential permits referred to in Paragraph (A) above.

(H) This authorization shall be effective for a period of two years from the date of this Order. Within six months prior to the expiration of this authorization, ENRON may reapply for renewal of the authorization for a period of time longer than the original two-year period.

(I) This authorization shall be without prejudice to the authority of any State or State regulatory commission for the exercise of any lawful authority vested in such State or State regulatory commission.

(J) ENRON shall make and preserve full and complete records with respect to the electric energy exported to Mexico. ENRON shall furnish quarterly reports to the DOE, within 30 days following each calendar quarter, showing the gross amount of electricity delivered and the consideration received during each month of the previous quarter, and the maximum hourly rate of transmission.

(K) Exports authorized herein shall be reduced or suspended, as appropriate, whenever a continuation of those exports would impair or tend to impair the reliability of the U.S. electric power supply system.

Issued in Washington, D.C., on February 6, 1996.



Anthony J. Compton
Director
Office of Coal & Electricity
Office of Fuels Programs
Office of Fossil Energy

4 pages

DRAFT -- 10/27/96

[6450-10-P]

DEPARTMENT OF ENERGY

OFFICE OF THE SECRETARY

FEDERAL ENERGY REGULATORY COMMISSION
RELATING TO CERTAIN AUTHORIZATIONS TO EXPORT ELECTRICITY
AND CONSTRUCT AND OPERATE RELATED FACILITIES

AGENCY: Department of Energy

ACTION: Notice of Delegation and Assignment

SUMMARY: Notice is hereby given of the delegation and assignment by the Secretary of Energy to the Federal Energy Regulatory Commission of the authority to carry out functions vested in the Secretary relating to certain authorizations issued by the Secretary to construct and operate border transmission facilities and to transmit electricity to a foreign country.

EFFECTIVE DATE: [date of publication]

FOR FURTHER INFORMATION CONTACT: Anthony J. Como, Department of Energy, Office of Fossil Energy. Telephone: (202) 586-9624.

SUPPLEMENTARY INFORMATION:

The Secretary of Energy (Secretary) has the authority under the Department of Energy Organization Act (DOE Act) (Pub. L. 95-91) to approve or disapprove applications to transmit electricity to a foreign country pursuant to section 202() of the Federal Power Act (16 U.S.C. 824a(e)). Moreover, the Secretary has the authority to approve or disapprove applications to construct and operate transmission facilities at the border between the United States and foreign country pursuant to Executive Order 10485 as amended by Executive Order 12038.

Both of these functions were originally vested in the Federal Power Commission. Subsection 301(b) of the DOE Act transferred to, and vested in, the Secretary all the functions of the Federal Power Commission not specifically vested by the DOE Act in the Federal Energy Regulatory Commission (Commission). Sections 401-407, 503, and 504 of the DOE Act set forth the jurisdiction and authority of the Commission, an independent body within the Department of Energy (DOE), and the Federal Power Commission's functions with respect to transmission of electricity to a foreign country and transmission facilities at the border were not specifically vested in the Commission. Furthermore, subsection 402(e) of the DOE Act provides that no function vested in the Commission which regulates the export or import of electricity shall be within the jurisdiction of the

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Commission unless the Secretary assigns such a function to the Commission.

As a general matter, section 642 of the DOE Act permits the Secretary to delegate any of the Secretary's functions to any officer or employee of the Department the Secretary may designate, including the Commission. More specifically, the Secretary's authority to regulate exports of electricity may be assigned in whole or in part to the Commission under subsections 402(e) and (f) of the DOE Act, after public notice of the assignment.

Pursuant to these provisions of the DOE Act, public notice is hereby given that the Secretary delegates and assigns to the Commission the authority to carry out certain functions vested in the Secretary. The assignment is in the form of a delegation.

The Commission, on October 4, 1996, issued an order in FERC Docket No. EL96-74-000 responding to a request from Enron Power Marketing, Inc. (EPMI) for transmission access across transmission facilities of El Paso Electric Company (EPE). In that order, the Commission required EPE to comply with its open access tariff by providing EPMI with transmission service from EPMI's designated points of receipt on EPE's transmission system to EPE's Diablo and Ascarate substations near the United States-Mexico border. The Commission further concluded that the Secretary has the jurisdiction, under section 202(e) of the Federal Power Act (FPA) and under the Executive Orders concerning Presidential Permits for construction and operation of border facilities, to act on requests for transmission access over the U.S. portion of the lines connecting the Diablo and Ascarate substations in the United States with the Insurgentes and Riverena substations in Mexico.

In its Order No. 888, the Commission required open and comparable transmission access across the transmission lines of public utilities in order to promote competition. The Commission's October 4 order found a gap in the Commission's authority to require open access directly to the border of the United States with Mexico. As a matter of policy, the Department strongly supports the emergence of a more competitive wholesale electricity market and considers open and comparable transmission access a critical factor in creating and sustaining a competitive market, and thus the Department supports the Commission's policy in this area. Because the Commission, under its current jurisdiction, regulates transmission access and the rates, terms, and conditions of transmission service for the great bulk of transmission facilities owned by EPE, and to permit uniform implementation of the Commission's open access policy, the Department has concluded that the Commission is the most appropriate agency to address the transmission access and related regulatory issues with respect to the EPE border facilities. Accordingly, DOE is delegating to the Commission its authority under the Federal Power Act and Executive Orders 10485 and 12038

to modify or condition EPE's Presidential Permits for its border facilities (DOE Docket No. PP-48-3 and PP-92) or EPE's authorization to export (DOE Docket No. EA-48-I) or both to provide for third-party access to transmission service over the facilities covered by the Presidential Permits, and to regulate the rates, terms and conditions for such service. Specifically, ~~the delegation order authorizes the Commission to impose terms and conditions, and to issue such supplemental orders, as the Commission deems necessary and appropriate in the following DOE dockets:~~

El Paso Electric Company

DOE Docket No. PP-48-3 -- Presidential Permit
DOE Docket No. PP-92 -- Presidential Permit
DOE Docket No. EA-48-I -- Export Authorization

The delegation amends to this limited extent, but does not otherwise rescind or supersede, the Secretary's prior delegation of authority to regulate exports of electricity to the Assistant Secretary for Fossil Energy (DOE Delegation Order No. 0204-127, February 7, 1989), subdelegated to the Director of the Office of Coal and Electricity (Delegation Order dated September 24, 1993).

DOE has issued export authorizations to four entities (other than EPE), including EPMI, that authorize export over EPE's border facilities. Further applications from other parties for authorization to export over these facilities may be received. DOE will retain its jurisdiction over these authorizations, and will consider making modifications, if necessary, to reflect any action taken by the Commission with regard to this matter.

Issued in Washington, D.C. on [date].

Hazel R. O'Leary
Secretary

Why

DEPARTMENT OF ENERGY
DELEGATION ORDER NO. 0204-
TO THE FEDERAL ENERGY REGULATORY COMMISSION

Pursuant to the authority vested in me as the Secretary of Energy (Secretary) by sections 642 and 402(e) of the Department of Energy Organization Act (Pub. L. 95-91) (DOE Act), there is hereby delegated and assigned to the Federal Energy Regulatory Commission (Commission) the authority to carry out such functions as are vested in the Secretary to regulate access to, and the rates, terms and conditions for, transmission services provided by the El Paso Electric Company on facilities covered by Presidential Permits PP-48-3 and PP-92.

In exercising the authority delegated by this Order the Commission is specifically authorized to modify, revoke, or attach terms and conditions to Presidential Permits PP-48-3 and PP-92 and Export Authorization EA-48-I under Executive Order 10485, as amended by Executive Order 12038, and section 202(e) of the Federal Power Act (FPA) and such other sections of the FPA vested in the Secretary as may be relevant, and to issue such supplemental orders in these dockets, as the Commission finds necessary and appropriate to the public interest. This authority is delegated to the Commission for the sole purpose of authorizing the Commission to take actions necessary if any, to effectuate open access transmission over the United States portion of the lines connecting the Diablo and Ascarate substations in the United States with the Insurgentes and Riverena substations in Mexico.

The authority delegated to the Commission may be further delegated within the Commission, in whole or in part, as ~~may be~~ *appropriate. Commission may determine.* *cto*

All actions taken pursuant to authority delegated prior to this Order or pursuant to any authority delegated by this Order taken prior to and in effect on the date of this Order are hereby confirmed and ratified, and shall remain in full force and effect as if taken under this Order, unless and until rescinded, amended, or superseded.

Nothing in this Order shall preclude the Secretary from exercising or further delegating any of the authority hereby delegated, whenever, in the Secretary's judgment, the exercise or further delegation of such authority is necessary or appropriate to administer the functions vested in the Secretary.

This Order is effective on [date of publication in the Federal Register].

[signature]
Secretary of Energy

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Department of Energy
Washington, D.C. 20585

JAN 27 1992

Kalend 5,514,828
S.N. 536,895(87)
DOE Case 5-74347

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Serial No. : 536,895(87)
Inventor(s): Ralph A. Dalla Betta, David R. Sheridan and
Daniel L. Reed
Filed : June 12, 1990
Title : NO_x SENSOR AND PROCESS FOR DETECTING NO_x

There are submitted herewith the original and one copy of a License to the Government of the United States, as represented by the United States Department of Energy, covering the invention in the above-identified application, for registry in the Public Register pursuant to Executive Order 9424.

The return of the original License after registry with appropriate notation is requested.

Sincerely,

Richard E. Constant
Assistant General Counsel
for Patents

Enclosures

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